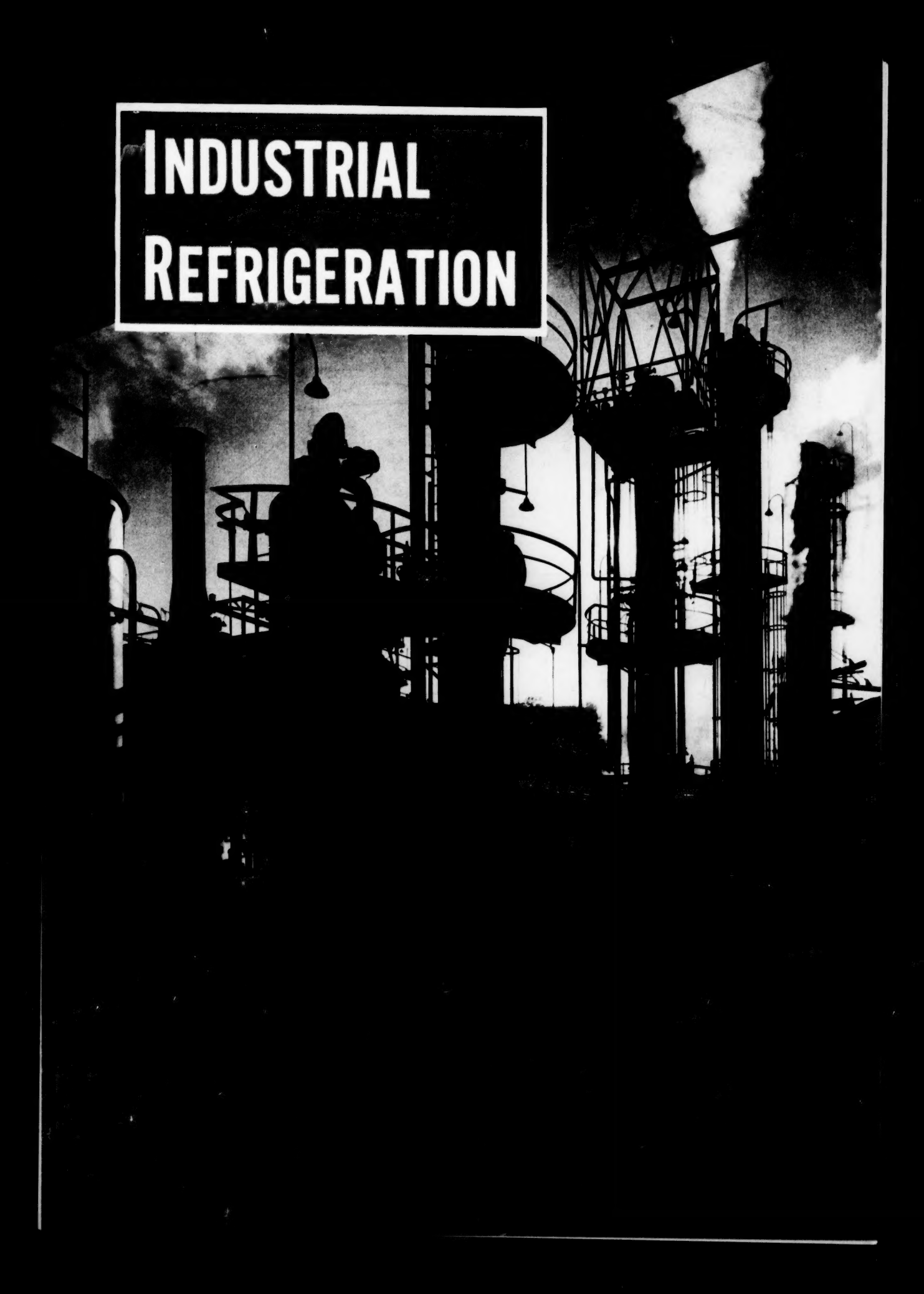
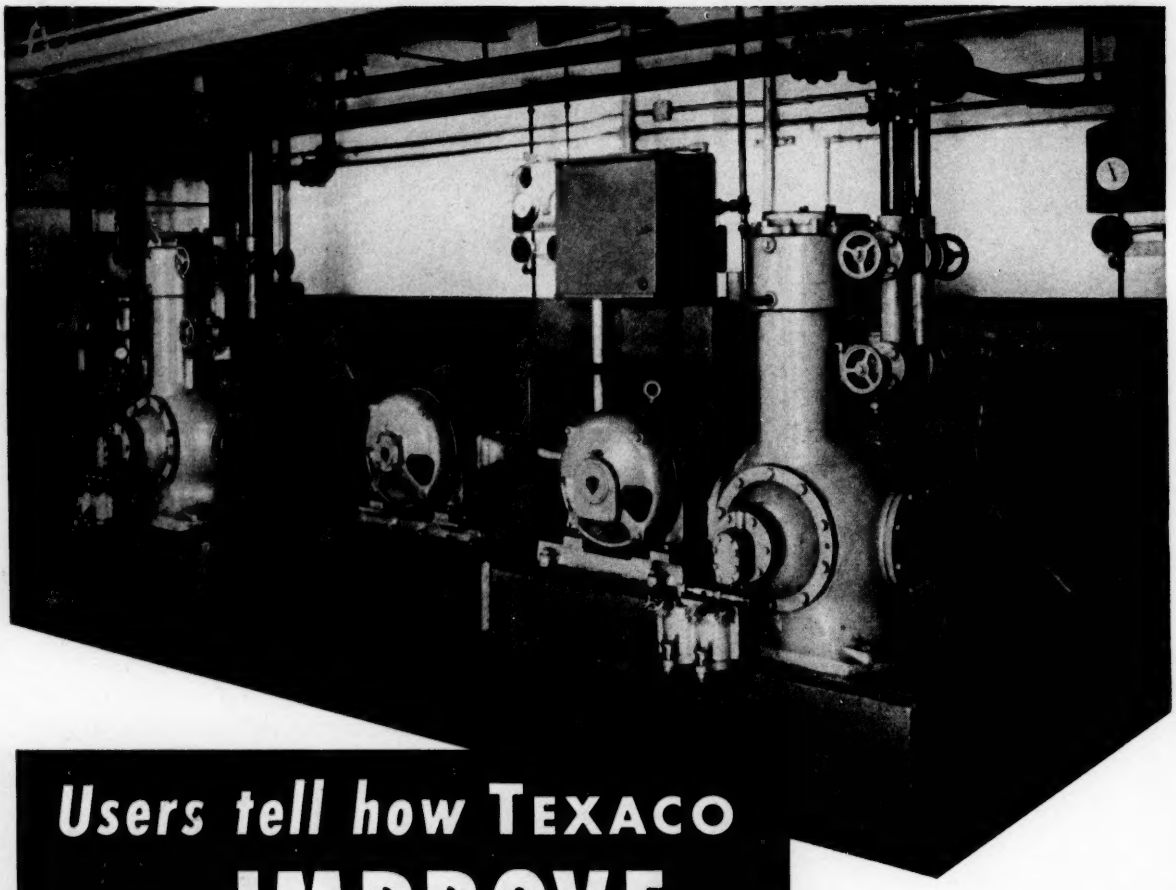

INDUSTRIAL
REFRIGERATION



Users tell how TEXACO *helps* IMPROVE COMPRESSOR PERFORMANCE

TEXACO-LUBRICATED compressors coast to coast are turning in great records for efficient, economical performance. *"Haven't had a sticky valve in 24 years,"* reports a California ice company.* *"Maximum refrigeration with minimum expense,"* says a New England refrigerated warehouse.*

To get comparable results from your own compressors, lubricate with *Texaco Capella Oil (Waxfree)*. This is the oil that *won't wax out in systems even down to minus 100° F.*, that has outstandingly low haze and floc temperatures, great stability and resistance to oxidation. It does not foam, is moisture-free and compatible with all types of refrigerants.

There is a complete line of *Texaco Capella Oils (Waxfree)*. You can get them in 55-gallon and 5-gallon drums, 1-gallon cans, and the more widely used grades in 1-quart containers—all refinery-sealed to protect purity and quality.

A Texaco Lubrication Engineer will gladly help you select the right one. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

**Name on request*

TEXACO

TEXACO Capella Oils (Waxfree)

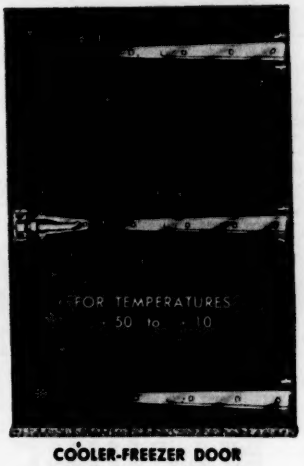
FOR ALL REFRIGERATING AND AIR CONDITIONING COMPRESSORS

"Butcher Boy"
REFRIGERATOR DOOR CO.

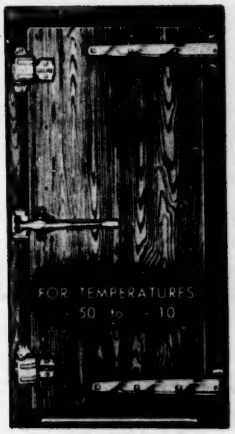
MOST DURABLE
ONLY 100% MODERN

REFRIGERATOR DOORS
BUILT IN THE WORLD

NEW "X-TYPE" DOORS
FEATURING "X-TYPE" STEEL DIAGONAL BRACING

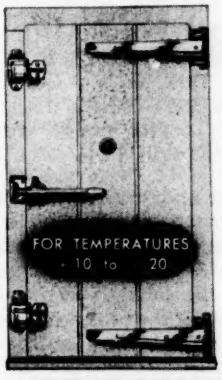


COOLER-FREEZER DOOR
- Modern streamlined job
- 100% "Douglas Fir"
- Sanitary hardware



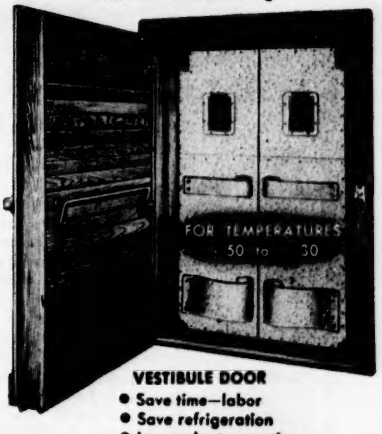
X-52 PLYWOOD PANEL DOOR
- Plywood front and back
- Extra heavy-duty hardware
- Special type gaskets

- Maximum insulation fill
- Most possible rigidity
- Allows reversal of swing



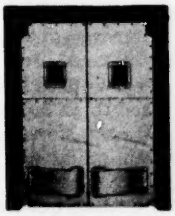
LOW TEMPERATURE DOOR
- Entire metal-clad front
- Extra heavy-duty hardware
- Special type gaskets

SUPER FREEZER (OVER-LAP) DOOR
- Extra-heavy construction
- Extra-heavy duty gaskets
- Extra heavy-duty hardware

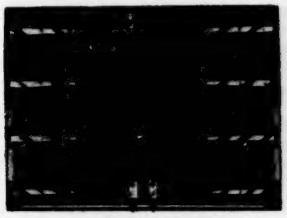


VESTIBULE DOOR
- Save time—labor
- Save refrigeration
- Large plant operation

TRACK DOOR
- For abattoirs
- Meat handling rails
- Banana rooms



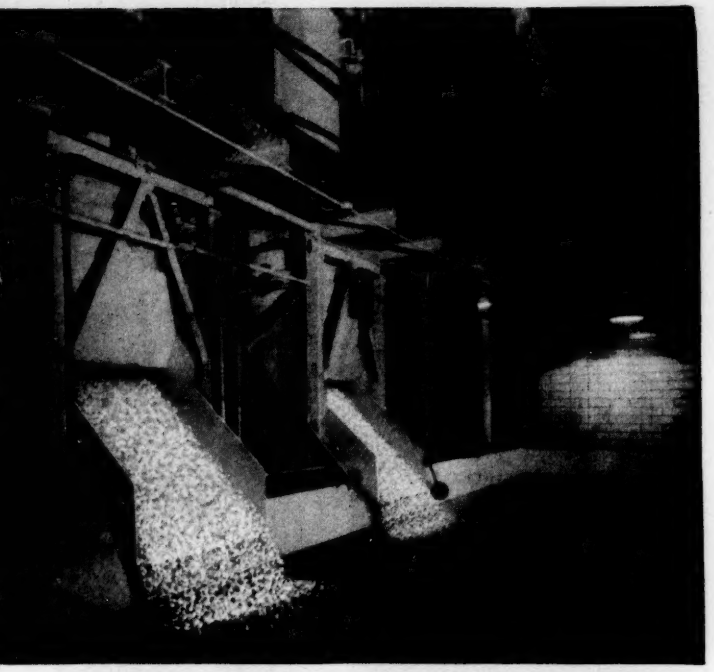
AUTO-CLOSE DOOR
- For loading dock
- Intra-cooler doors
- Heavy trucking



DOUBLE DOOR
- For palletizing
- For carloading
- For elevator shafts

BUTCHER BOY REFRIGERATOR DOOR CO. • HARVARD, ILL.

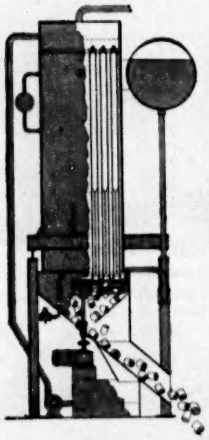
NOW!
PROCESS INDUSTRIES
SAVE 50% OF THEIR
COLD WATER COST
with....



Tube-Ice Machines and Latent Heat Water Tank at Burkhardt Brewing Co., Akron, Ohio.

Vogt Automatic TUBE-ICE MACHINE

HOW THE TUBE-ICE MACHINE FUNCTIONS



Patent Numbers 2,200,424, 2,239,234, 2,396,308. Other Patents Pending.

In making ice, water is pumped to the top of the freezer and flows downward along the inside walls of tubes into a water tank. Refrigerant in shell surrounds tubes and freezes water into cylinders of ice. An automatic timing mechanism operates suitable valves to control all functions of the machine. Ice is freed from the tubes by thawing when the refrigerant is displaced by high pressure warm gas from the compressor.

To cool water only, the suction valve is set to raise the evaporating pressure above that required for making ice.

Employing direct application of the refrigerant, all expense incidental to other systems is eliminated.

120 TONS OF CONNECTED REFRIGERATION CAPACITY PROVIDES THE EQUIVALENT OF 300 TONS REFRIGERATION DURING THE WORT COOLING PERIOD AT THE BURKHARDT BREWING CO., AKRON, OHIO, BY MEANS OF THE VOGT WATER COOLING SYSTEM PICTURED ABOVE!

Here, Vogtice is made at night and stored in the water tank and cold water is made by the same machine during the day, thereby utilizing refrigerating capacity around-the-clock. The stored ice acts as a flywheel by cooling make-up water admitted into the tank to augment the supply made by the machine to meet the peak wort cooling loads. This system levels out refrigeration load demand with a resulting reduction in demand charges on electrical energy, and the use factor of installed equipment approaches 100%.

Dairies, Vegetable and Fruit Packers, Wax Paper Plants, Breweries, Rubber Mills, Bakeries, Soft Drink Bottlers, etc., can cut cold water cost to a new low by installing the Vogt water cooling system. And it is a "natural" for air conditioning in process plants where the demand for refrigeration is limited to 12 hours or less in any 24 hours. Theatres and department stores requiring no more than 12 hours of air conditioning per day can use this system with a refrigerating capacity but one-half or less of that otherwise required. Consult our engineers — no obligation.

HENRY VOGT MACHINE CO., Louisville, Ky.

BRANCH OFFICES: NEW YORK PHILADELPHIA CLEVELAND CHICAGO ST. LOUIS DALLAS

LETTERS

(Letters to the editor are welcome from readers of INDUSTRIAL REFRIGERATION on any subject of general interest.)

Likes Utescher Articles

Point Clear, Ala.

I received three issues of INDUSTRIAL REFRIGERATION and I must say I was impressed with the articles by Mr. Erich B. Utescher in the May issue.

CHARLES F. BELEW,
Grand Hotel

Industrial Refrigeration

Waynesboro, Pa.

Our attention has been attracted to the article on Industrial Uses of Refrigeration in your August issue. This is a valuable article and we are happy to have assisted by furnishing information on a number of those uses. We were also glad to see in your NAPRE Section our remarks about the alignment of crank shafts.

TERRY MITCHELL
Frick Company.

Soak The Rich?

A STUDY of 1951 income tax returns by the Internal Revenue Service reveals some interesting figures. In that year, 171 persons reported incomes of $1 million or more. Their total incomes were $344,640,000 of which Uncle Sam took 62 percent or $213,654,000 for taxes. These taxes represented less than 1 percent of the Government's total tax receipts. The largest single group of taxpayers were in the $3,000 — $3,499 bracket. Over 5 million of them paid more than $1,310 million in taxes which accounted for 5.4 percent of the government's total take. — NARW QUICK SHEET

Iceman Gets Attention

THE iceman can still command attention, according to a news report from Omaha. Mrs. William Joseph of that city tells of taking her 4-year old daughter shopping. They passed an ice truck and beside it stood the iceman balancing a 100-pound cake on his back.

"Mama, look at that king-size ice cube," whooped the child.

Industrial Refrigeration

formerly ICE AND REFRIGERATION
Now in its 63rd Year of Publication

J. F. NICKERSON, FOUNDER

Vol. 127 September, 1954 Number 3

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The Cover:

Absorption and stripping columns, part of the purification system for manufacturing industrial ammonia, silhouetted by escaping steam and California sky. Columns in the Shell Chemical Corporation NH_3 plant Ventura, Calif., remove CO_2 and Carbon Monoxide from crude synthesis gas. See story on page 16.

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What's New

MACHINERY
APPLIANCES • PROCESSES

Refrigerant Dispenser Valve

THE production of a new universal Refrigerant Dispensing Can Valve designed for use with all known canned refrigerants is announced by Superior Valve & Fittings Company, Pittsburgh, Pa.

Universal Refrigerant Dispersing Can Valve

The special valve incorporates a quick piercing and sealing action that pierces clean and seals positively. A specially designed, frost-resistant rubber gasket is the secret of the seal. The self contained valve allows any portion of the canned refrigerant to be expelled without having to dispense the entire can. The clamp and valve are designed to be reused indefinitely. It is a packed type shut-off valve incorporating a ¼ inch SAE Flare outlet for attachment to any standard charging hose.

New Sealing Tape

A NEW easy-to-use elastic compound sealing tape, extruded with a reinforcement core of tobacco cloth, has been announced by Presstite Engineering Co., St. Louis. Known as No. 162 Elastic Compound Tape, it is adaptable, for example, to seal thermopane-type glass in refrigerated display cases and to seal glass in frames and channels of steel and aluminum window sash.

The jet-black, rubbery tape releases readily from its backing, holds its shape due to its cloth core, and will not flow out when seams are bolted or riveted. Odorless, tacky and having excellent resistance to water and moisture, the sealer is unaffected by temperatures from minus 30 F. to 180 F.

No 162 Elastic Compound Tape is one of many Presstite sealing tapes ranging in color from white to black, varying in gas, water and water vapor, and furnished in extruded beads, tapes and ribbons.

Freezer Doors Unfrozen — New Device Melts Ice

AN INVENTION, designed to save hundreds of dollars a year to operators of cold storage warehouses and may be even housewives, has been accepted for patenting by the U. S. Patent Bureau. This invention is the outgrowth of many years of facing a problem and studying its particular situation by John V. Grubbs, superintendent of the Cold Storage Plant at the Alabama State Docks, Mobile, Ala.

In the early 1930's, before Grubbs became an executive in the cold storage department, he spent many long, hard hours chipping ice that had been formed around freezer doors by condensation of moisture. At this time, he resolved to do something about this situation that cost much in time, money and labor, to say nothing of the cost of replacing doors and gaskets damaged in chipping away the ice with hammers and chisels.

This past year, he approached the operations manager of the State Docks with the idea of allowing him to spend some money to try out an idea he had, an idea that should permit freezer doors to remain ice-free all the time.

Plan Saves Money

The cold storage executive was interested in the fact that the cost of this plan would be less than the cost of replacing the cork gaskets on a door which are damaged each time the ice is chipped away. Grubbs was given the "go-ahead" signal and he started to work, constructing his first model in December 1953. This first model was a failure. As Grubbs pointed out, "There was no control on this model. We had constant current and no cut-off unit to control the heat from the model."

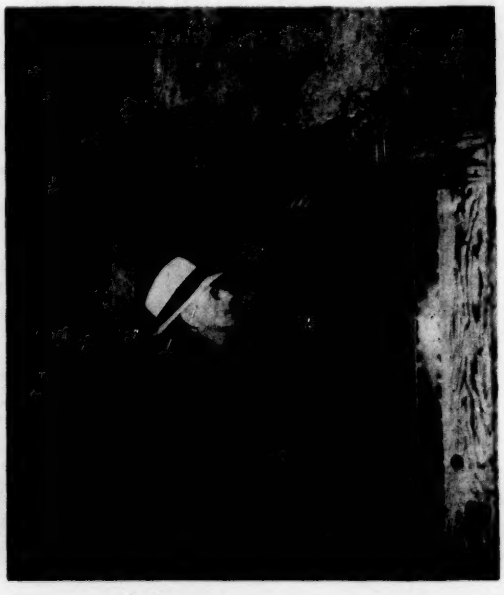
Several weeks later he modified the model and installed it on one of the freezer doors. This model consists of a series of wires run under a facing plate all around the edge of the door. In has thermostatic controls which allow just enough heat from the electric current to melt any ice and dry any condensation of moisture around the edge of the door. This model has been working perfectly ever since, and now practically all the doors of the State Docks cold storage plant have been equipped with these units.

Grubbs describes his invention as being economical — costing only $100 for the unit including installation. It has been installed on practically all of the freezer doors in his plant, and is working perfectly. "This invention is a great asset for the entire freezer industry and can even be adapted to home freezers," Grubbs declared. "The days of frozen doors are over," he added.

Similar Device For Same Problem

A similar device has been developed by Walter C. Wolgast, Gen. Supt., Hygeia Refrigerating Company, Elmira, N.Y. and is now in use in that plant. It also employs a thermostat and a heating cable running around the door frame which is held in place by insulated staples and a strip of galvanized steel.

Mr. Wolgast's design employs a double cable around the door frame and under the concrete sill. One inch angle irons are also used to protect the ridge seal from damage by trucks.

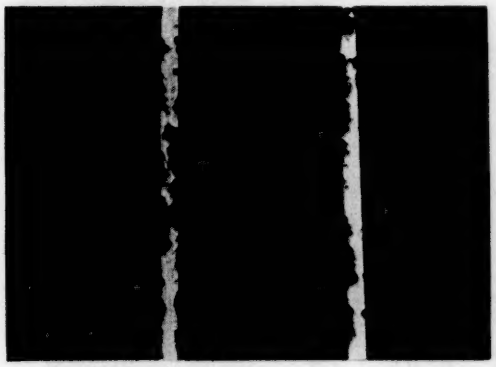


John V. Grubbs, Superintendent Cold Storage Plant, Alabama State Docks, Mobile, Alabama, inspects plate that conducts heat current around door facing that prevents ice formations from condensation.

In planning or estimating cold storage insulation...

For NEW MODERN PRODUCE COOLERS

Palco Insulation Board laid to required thickness provides ample strength to support finish slab of reinforced concrete and handle all anticipated storage loads.



Palco Wool is completely self-supporting, non-settling—can be put in place and inspected to assure void-free application before interior lining is put in place.

Specify

SELF-SUPPORTING, NON-SETTLING...

PALCO INSULATION WOOL®

PALCO INSULATION BOARD®

Market Distributing Company's new Dallas plant is one of the most modern installations now in operation. Among its features are three produce coolers with a holding capacity of eight box cars. Each is normally held at 25° to 45°, but can maintain constant temperatures as low as 0° due to the high insulating efficiency of Palco Wool loose fill insulation in walls and ceilings, and Palco Board Insulation supporting the concrete floor slab. The produce coolers are lined with Palco Redwood, and are used for year-round storage of Summer and Winter fruits and vegetables. For the most effective combination of insulating materials for the best engineered cold storage application, get full details on Palco Wool and Palco Board Insulation.

Write today for your free copy of Cold Storage Manual, and free sample of Palco Wool and Palco Board Insulation.

THE PACIFIC LUMBER COMPANY

100 BUSH STREET, SAN FRANCISCO, CALIFORNIA
35 EAST WACKER DRIVE, CHICAGO, ILLINOIS

PALCO WOOL INSULATION
has high efficiency of .26 B.t.u., ideal for all loose fill applications.

PALCO BOARD INSULATION
offers low thermal conductivity of .30, with high structural and compressive strength. 1", 2" or 3" thickness, 12"x36", 18"x36", 24"x48" and special sizes to 48"x72".

Cold Galvanizing Process

A NEW approach for protecting iron and steel surfaces from corrosion is announced by the Chemical Division of Galvicon Corp. A product known as "Galvicon" is applied by brush or spray method. It combines with the base metal and actually galvanizes it. In most cases it will out-perform the standard zinc coatings which are applied with heat, according to the manufacturer.

It is now possible not only to give mechanical protection, but chemical protection as well, on location or in the plant without the necessity of dismantling or interrupting operations. Iron or steel surfaces coated with "Galvicon" create an electrochemical union, thereby uniting the zinc with the base metal's surface.

This product is said to differ basically from other so-called metallic paints containing zinc, in that it combines with the base metal setting up electrical continuity. It offers true cathodic protection. It leaves a coating of 96 parts, by weight, of chemically pure zinc. It is claimed that in instances where it is directly applied onto adhering rust, it induces the rusted area to create its own non-flaking coating, thereby stopping any further rust and preventing "rust creep".

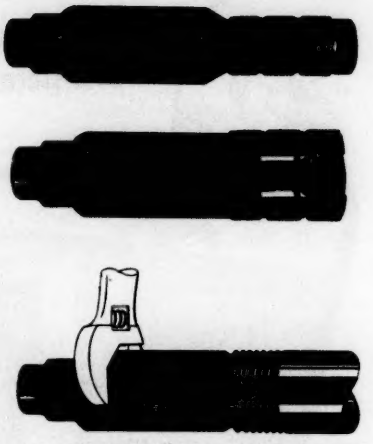
The product is claimed to eliminate the necessity of dismantling required by other types of zinc galvanizers. It can be applied directly to the object, regardless of size. A single coating, brushing consistency, will give a coverage of approximately 625 square feet per gallon. Spraying almost doubles coverage. Within 40 minutes after application it will be tack-free and will be completely dry for use within 48 hours. The dried film of "Galvicon" contains nothing injurious to health. It is now available in cans in four sizes: ½ pint, quart, one gallon and two gallon.

New Internal Tube And Pipe Wrench

A NEW type of internal expanding pipe and tube wrench known as "Tube Tule" is now being manufactured by the Double T Products Company, Hawthorne, Calif. The device has a multiplicity of uses in maintenance of industrial plants which require the use of water, air, oils, gases and fluids of any kind.

When expanded in a pipe or tube of any material it exerts a gentle but positive internal grip. There is no slippage according to the manufacturers. It does not distort the wall of the pipe or tubing as it fits fully around inside and the applied pressure is equal in all directions wherever it comes into contact with the internal wall.

An important feature is the fact that it does not bite out any metal or other piping material, nor does it shred it in any way to contaminate the conveyed air, water or other fluids, or clog the lines or valves which are a part of the conveying system.



The "Tube-Tule" in use. Top, internal grip retracted. Center, expansion head open. Bottom, pipe application. Knurl at left operates expandable work head. Hex wrench used to tighten grip and turn pipe.

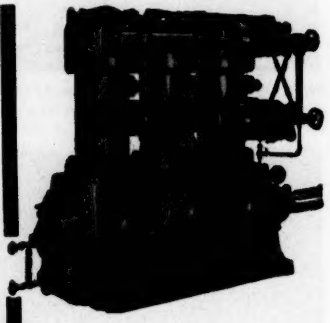
The internal expanding section is composed of six equal round-surface sections, which expand uniformly by forced movement up the beveled section of the head. The internal expanding surface may be brought into a positive grip with the inside of a pipe or tube by simply turning the knurled hand knob. Then additional pressure can be applied with a wrench fitted onto the hexagon body section.

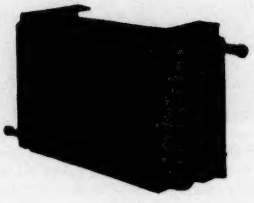
The Case of the Dead Giveaways!

By HOWE . . . THE WORLD'S CHILLER

Business seemed good, but John Q. Engineer was worried. Something was missing . . . namely profits! He called in a Howe "private eye" who went quickly to work and later sent in this report: "The culprit gave himself away. Variable temperatures and humidities were exposed, caused by the obsolete inefficient refrigeration system. Dead giveaways!"

And now? John Q. has new Howe tested equipment. Gives him *exact* temperatures and humidity at *all* times. Better production, risk of spoilage cut to the bone. Product perfection through controlled refrigeration make John Q.'s profits *real*. Departing for his next case, the Howe "private eye" said, "Your new Howe will keep running longer, with less trouble. Over 42 years' specialization does the trick."

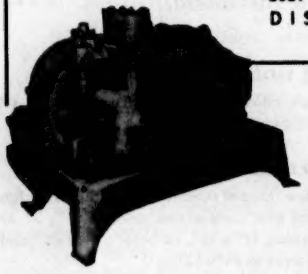




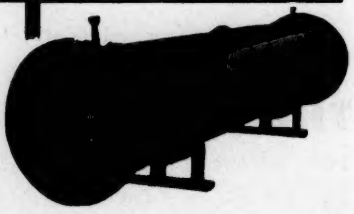
HOWE ICE MACHINE CO.

2829 Montrose Ave., Chicago 18, Ill., Cable: HIMCO • Chicago

DISTRIBUTORS IN PRINCIPAL CITIES



CONSULT HOWE on all your refrigeration problems. Since 1912 manufacturers of ammonia compressors, condensers, fin coils, locker freezing units, air conditioning (cooling) equipment. Immediate delivery!



Magnetic Latch Would Prevent Icebox Tragedies

A DEVICE to make abandoned refrigerators safe for children has been designed by Silas A. Morehouse, Chantilly, Va., an Earlybird pilot and former civilian employee of the Air Force.

The icebox door is held closed by magnetism instead of by a spring latch. One magnet is fastened to the center shelf of the box; another to the inside of the door. When the center shelf is removed there is nothing to hold the door closed. And when the center shelf is in place, a child will not fit in the icebox.

The inventor had a search made at the Patent Office and found that no patent has been issued for a safety refrigerator door based on using the center shelf as a protective device. The idea of using magnets in refrigerators, however, is not new. General Electric used small alnico magnets embedded in the gasket around the outside of the door on its deluxe models in 1950 and 1951. The magnets were made of nickel, cobalt and aluminum. The Korean war made these materials critical and the line was discontinued in 1951. The purpose of the magnetic door was convenience, not safety. A foot treadle disengaged the magnets. General Motors also experimented with magnets for its Frigidaire boxes.

Regarding the Morehouse invention, called "silok" an industry representative said it would not hold the refrigerator door tight enough to prevent air leakage around the rubber rim. The magnetic latch used as a demonstrator on a refrigerator had a pressure of eight pounds to the square inch. Industry engineers said 30 to 40 pounds is necessary.

Chemical Extinguishes Motor Fires Without Damage

FOR some years, fire protection experts have recognized the ability of dry chemical fire equipment to extinguish electrical fires quickly and economically, but some have hesitated to recommend it because of a belief that the chemical is abrasive and may damage electrical motors or other sensitive equipment.

Now, however, evidence has come to light which tends to disprove this theory. Ansul Chemical Company, of Marinette, Wis., pioneer producer of dry chemical equipment, reports, for example, that tests have been made in Winnipeg, Canada, which indicate that dry chemical can be used safely on electrical motors, without any danger of abrasion. The tests were conducted by Power and Mine Supply Company Limited, of Winnipeg, Canada.

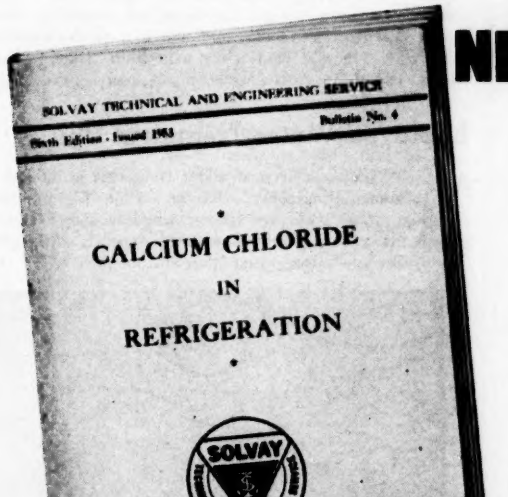
Equipment used in the test was a seven and a half horsepower 550-volt direct current open type electric motor and two four-pound Ansul dry chemical fire extinguishers. The direct current motor was chosen for the test, instead of an alternating current motor, because it was felt the DC motor was a finer piece of equipment, requiring more attention and maintenance, and that any damage that might be incurred would show up better in it.

The motor was put into operation, and, while running, the contents of one four-pound extinguisher were emptied into it through both end bells. The armature fields, commutator, brushers, brush-holder and all other parts were thoroughly covered with the dry chemical (which actually is specially-treated sodium bicarbonate). According to the report, the motor continued to operate without any effect whatsoever, as normal ventilation carried off excess dry chemical.

The motor was then stopped and the contents of another four-pound extinguisher were partially discharged into the motor. This time all ventilating slots in the armature were filled, the commutator was completely covered and the brush-holder packed with dry chemical. After motor was again put into operation, it performed just as it did before the tests started.

When the motor finally was stopped, an air hose was used to blow the remaining dry chemical off and out of the motor, including the ventilating slots on the armature, fields, etc. This required about one minute.

Experts declared the motor would not require dismantling or overhauling, but that relubrication of the bearings would be desirable. No abrasive damage to the commutator was found.



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THERMOBANK
the defrosting system that makes Ammonia SHINE!
LUCERNE MILK COMPANY, of Los Angeles, Calif., modernized with KRAMER AMMONIA THERMOBANK automatic defrosting system to end years of expensive manual defrosting.

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"AFTER" photo, same room, modernized with KRAMER Ammonia THERMOBANK at minus 25° F; 6400 gallons hardened daily.

INSTALLED BY ASSOCIATED REFRIGERATING ENGINEERS, LOS ANGELES, CALIFORNIA.

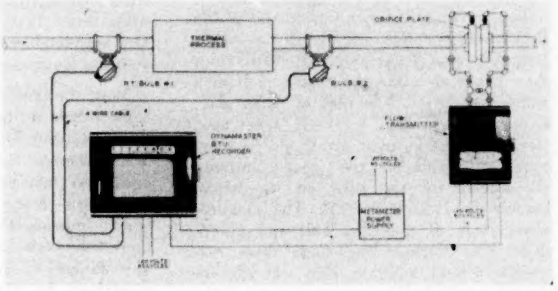
WRITE NOW FOR BULLETIN TA-182

KRAMER TRENTON CO.
Trenton 5, N.J.

New Dynamaster Btu Recorder

FAST, continuous measurement and control of rate-of-heat input or output is now possible through the use of the new Dynamaster Btu recorder-controller systems announced by The Bristol Company of Waterbury, Conn. These can be used to measure and record the quantity of heat supplied to or drawn from process vessels, refrigerating plants, air conditioners, and a wide variety of other heat-exchanging devices. Control apparatus is available for regulating the temperature of flow-rate of the heat-transfer medium.

In the basic Bristol Btu recording system, one Dynamaster measures the temperature difference with two resistance thermometer bulbs and receives the flow-rate from a flow transmitter. From the two variables, it then continuously computes and records the Btu product.



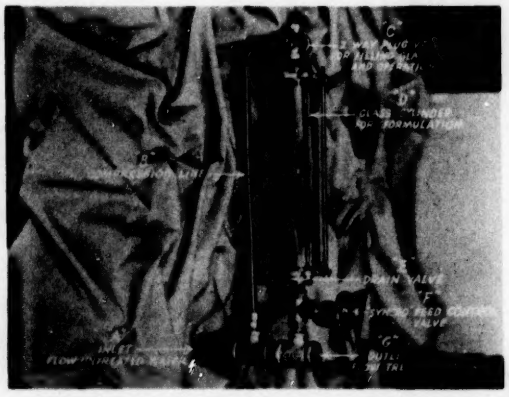
New Dynamaster Btu recorder controller system.

Other systems are offered that provide for recording temperature difference along with Btu on a single round or strip chart by a single two-pen Dynamaster, recording of Btu and either flow-rate or temperature difference by two separate instruments. In most instances, totalizers can also be furnished with the Btu recorder to integrate the energy or heat-transfer.

Matched resistance bulbs are not required. An optional bulb trimming adjustment can be supplied, enabling the user to install a replacement bulb, and match it to the system by trimming the bulb and lead wires with bulb trimming adjustment. Other systems, to meet specific needs, can be provided.

Improved Water Treatment Unit

A COMPLETE service of water treatment is offered by Water Treatment Engineers, Cleveland Ohio for preventing rust, corrosion, iron, scale and algae, which is inexpensive, easy to install and requires no maintenance expense. Although the Jud Syncro Feeders soften water, they do not have to be regenerated

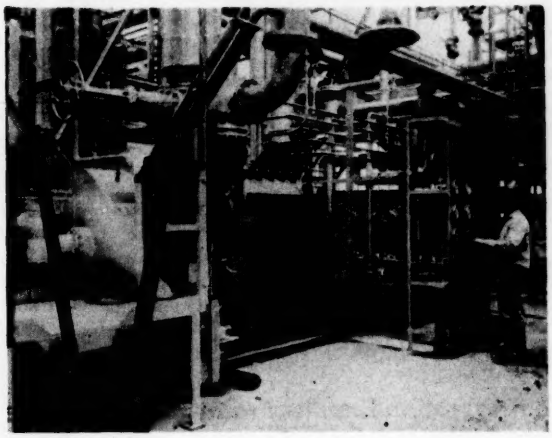


Jud Syncro Feeders water treatment unit

or backwashed. WTE foundations are clear, straw or amber color liquids, which are patented and guaranteed to give results in hard or soft water (irrespective of hardness); used for air conditioning systems, condensers, compressors, cooling towers, boilers, etc.

Liquid Injection Reduces Heat of Compression

THE FIRST anhydrous ammonia centrifugal condensing unit to be installed in any U.S. plant has been installed by Worthington Corporation at Phillips Chemical Company's Pasadena, Texas, plant by Chemical Construction Corporation. Two Worthington GUR 3R-6 Centrifugal Ammonia Compressors, each driven by a 2,500 hp 9140 rpm Worthington type "T" non-con-

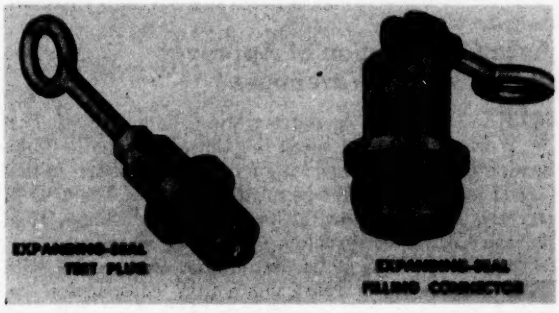


Condensing Unit in Phillips Chemical Company plant, Pasadena, Texas.

densing steam turbine, provide 3,000 tons of ammonia refrigeration at 14 F. evaporator and 100 F. condensing temperature. Unit reduces heat of compression by liquid injection, thereby permitting use of six stages of compression in a single casing. Without liquid injection, it would be necessary to install two casings in tandem.

Quick Seal Test Plugs

EMPLOYING a cam-lever action to expand and draw a flanged rubber bushing against inside wall and face of any opening, new "quick-seal" test plugs and filling connectors introduced by Mechanical Products Corp. Chicago, Ill. provide an effective double-sealing action. Openings may be closed and pressure lines adapted for air or hydrostatic testing of tanks, boilers, barrels, drums, radiators, etc.; also many types of cast or fabricated vessels, assemblies and pressure systems.

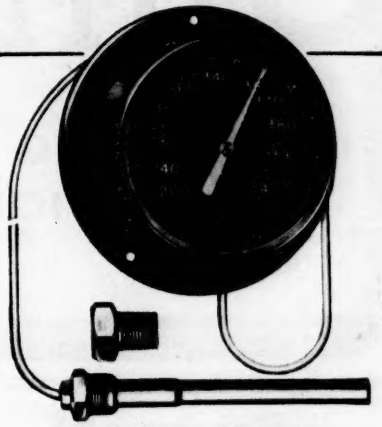


New Quick-Seal Test Plug

Recently introduced, these expanding plugs and connectors are made for standard pipe openings from ½ to 4 inches and recommended for low pressure testing. Special sizes and adaptations can be supplied. These units, it is claimed, save time and labor in production testing and are equally effective in all types of plain or threaded openings, including flanged, spudded or drawn openings, blind hole fittings, couplings, deep openings, etc.

Operation is simple, fool-proof, fast and effective. Seals on all units are adjustable for amount of expansion.

It's easy to read this honest face



14KV123, $38.00

THE THERMOGUIDE* Dial Thermometer is an extremely reliable and sturdy vapor-actuated instrument for applications such as:

Brine Lines Brine Tanks Ammonia Lines
Cold Storage Rooms Refrigerators

It's available in a variety of standard dial ranges from minus 40 to +120°F. There's a choice of four forms of bulb and connection, and the bulb and well material can also be selected to fit the application.

Some features of its construction include: pressed metal case—base diameter 6½"; bushed bearing movement, with wide surfaces on pinion and sector for minimum wear; 5" black metal scale with large figures and graduations, making it easy to read from a considerable distance; five feet of ⅛" diameter copper tubing as standard equipment. (Longer lengths available at slight extra cost).

Ask your Taylor Field Engineer for information about indicating, recording and controlling instruments designed to meet the demands of modern refrigeration, or write for **Catalog 300JR.** Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada.

Instruments for indicating, recording and controlling temperature, pressure, flow, liquid level, speed, density, load and humidity.

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NO SHAPE IS TOO COMPLEX

AMERICAN HAIR & FELT COMPANY

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PRESS BRIEFS

Cold Storage Warehouse Collapses

AN ESTIMATED one million pounds of food was destroyed when four floors collapsed in the cold storage warehouse of Frank Pilley & Sons, Sioux City, Iowa. No one was injured. The collapse caused dislocation of quantities of frozen foods, butter, meat and other products. Refrigeration also was damaged, but emergency repairs were made. The plant is operated by City Products Corporation, Chicago, Ill.

One theory of the cause was that the underpinning of the building had been weakened many months ago by flood waters. The losses were reported to include 800,000 pounds of frozen eggs, 110,000 pounds of butter, 6,000 gallons of ice cream, 1,500 pounds of bacon. Much of the space in the building was used by the Commodity Credit Corporation for storage of butter purchased under the government buying program. Upwards of 60,000 pounds of livers and neckbones were salvaged without damage, as was several thousand pounds of butter, and frozen eggs amounting to nearly two million pounds.

Refrigeration Exports From Great Britain

DURING May, 1954 air conditioning and refrigerating machinery to the value of £896,030, weighing 1,487 tons was exported from the United Kingdom.

Seventy eight tons went to the Union of South Africa, 46 tons to India, 28 tons to Pakistan, 96 tons to Australia, 99 tons to New Zealand, 95 tons to Canada, 343 tons to other commonwealth countries, 70 tons to Eire, 79 tons to Sweden, 38 tons to Western Germany, 64 tons to The Netherlands, 157 tons to France, 1 ton to Brazil and 298 tons to other foreign countries.

During the same month 1,590 tons of complete refrigerators, including complete mechanical units of a storage capacity not exceeding 12 cubic feet were sent overseas. The 1,590 tons comprized 18 tons to the Union of South Africa, 17 tons to Southern Rhodesia, 16 tons to India, 34 tons to Australia, 72 tons to New Zealand, 252 tons to other commonwealth countries, 54 tons to Eire, 290 tons to Sweden, 49 tons to the Netherlands, 56 tons to Belgium, 41 tons to France, 125 tons to Italy, and 566 tons to other foreign countries.

Asks Cancellation of Approval of Fort Worth Warehouse

THE Texas Ice & Refrigerating Company of Fort Worth, Texas, has asked the Office of Defense Mobilization to cancel approval it gave for construction in that city of a $1,175,000 refrigerated warehouse. The O D M recently granted approval to the United States Cold Storage Co. for construction of the new warehouse.

The Texas Ice & Refrigerating Co. filed a plea with ODM, asking for a rehearing on the construction approval certificate and cancellation of it "unless the essentiality and the necessity" of the new warehouse was established. The ODB certificate, the petition states, was issued between June 17 and June 30 on the ground that the proposed new facility was required in the national interest.

The petition, submitted by Washington attorney John K. Pickens, declared that there was actually an excess of storage facilities already existing in the Fort Worth-Dallas area.

In the Spotlight

COOLING TOWER performance is becoming more important as more installations are being put into operation, particularly as this has a direct bearing on dwindling water supplies in many sections. The modern cooling tower is designed to eliminate wasteful practices of the past. A valuable contribution to this subject is provided in the article on page 13.

AMMONIA has many important uses, including applications in refrigeration and as an ingredient of fertilizers. In the new plant of the Shell Chemical Company at Ventura, California, refrigeration is used in three of the process steps in the manufacture of ammonia. This process is described and illustrated in the article which starts on page 16.

REFRIGERATED semi-trucks are being utilized by a west coast freight line for shipping perishables to Alaska. The company operates a fleet of eight ocean-going tugs and fleet of barges out of Seattle, carrying van boxes equipped with refrigerating units. For description and pictures of the refrigerating equipment see article on page 19.

AIR RECOVERY, the process of cleaning air of certain odors by activated carbon is a useful tool in the hands of the engineer to aid his effort to build operating economy into air conditioning systems. The author of the article starting on page 21, based on his own experiences in installing such systems, tells how this may be accomplished.

QUICK FREEZING of candy to give it "kitchen fresh" flavor over an extended period of time is intriguing several candy manufacturers.

THE ICE BUSINESS is what you make it, according to successful ice men who reported bigger sales and profits in 1953. One policy, common to all, stands out; that is to make ice available to people when they want it, where they want it, and the way they want it. A compilation of their views and experiences is published in the article starting on page 23.

AN APPLIANCE Division has been developed by The Middletown Ice & Coal Company, Middletown, Ohio, to sell and install modern kitchen equipment and other household appliances. With one man and two helpers a volume of over $100,000 a year has been built. Details are given in the article on page 32.

DELEGATES to the annual convention National Association Practical Refrigerating Engineers, to be held in New Orleans November 2-4 will have an opportunity to visit a sugar refinery. The article on page 42 presents a good preview of what they will see there.

A PROPOSAL to change the name of the American Society of Refrigerating Engineers to The American Society of Refrigeration and Air Conditioning Engineers was presented at the mid-year meeting of the Society, held July 11-14. See report on page 44.

A NEW refrigerated warehouse and freezing plant will be built in Forth Worth, Texas by the United States Cold Storage Corp. It will have a freezing capacity of 250,000 pounds a day and cold storage capacity of 20 million pounds in cooler and freezer space. This new facility will provide Fort Worth with needed additional freezer and storage space. Construction of the new plant is announced on page 28.

REFRIGERATED warehouse space throughout the country, both cooler and freezer, is available to meet all current needs, according to a national survey made by the National Association of Refrigerated Warehouses. The report states that space is now available to store 152 million pounds of freezer products and 100 million pounds of cooler products. Details are given in the article on page 27.

THE AUTOMATIC Package Freezer eliminates much manpower and also horsepower in quick freezing processes according to Frank W. Knowles, manager of the Belt Ice Corp., Seattle, Wash. This equipment, he says, makes it possible for a food freezing plant to use a production line method for the product. The subject is discussed in the article starting on page 35.

SHIPMENTS of components and accessories for air conditioning and refrigeration equipment in 1953 amounted to 293 million dollars according to report by the Bureau of The Census, Department of Commerce. This report, which is summarized on page 47, includes a historical summary of the quantity and value of this equipment for the period 1949 through 1953.

A PROBLEM in low temperature warehousing is the tendency of ice to form from condensation of moisture around freezer doors, making it necessary to spend many hours chipping the ice away. But now a device is available which eliminates all this, as told in the article on page 4.

FROZEN French fried potato is the second ranking frozen vegetable in retail sales, exceeded only by peas. Last year, 3½ million bushels of Irish potatoes were used for this product.

Remember

RUBATEX *Insulation Hardboard*

*Makes More Cents**

ZERO moisture pick-up of Rubatex Insulation Hardboard installed in your freezer plant, cold storage room or sharp freezer space means big savings for you. May be installed just as received from factory — no water vapor barrier need be applied. Here's positive moisture control low temperature insulation which prevents surface and internal condensation — resists deterioration — prevents damage to machinery and foodstuffs.

PLUS

* TEMPERATURE CONTROL SAVINGS — Constant low heat conductivity assures positive temperature control — prevents costly food spoilage.

* POWER SAVINGS—Requires only 53% as much power as other insulating materials to maintain low temperature.

* SANITATION CONTROL SAVINGS —Rot, vermin and termite proof—cannot breed or feed anything objectionable.

TYPICAL INSTALLATIONS

Abbotts Dairies, Inc.
Philadelphia, Pa.

Avco Manufacturing Corp.
Cincinnati, O.

Food Fair Stores, Inc.
Philadelphia, Pa.

Fruehauf Trailer Co.
Chicago, Ill. — Detroit, Mich.

Grumman Aircraft Engineering Corp.
Bethpage, L. I., N. Y.

Geo. A. Hormel & Co.
Austin, Minn.

The Liquid Carbonic Corp.
Chicago, Ill.

Write for our "Design Data Bulletin RBH-53", Dept. IR-9 Great American Industries, Inc., Rubatex Division, Bedford, Virginia.

PIONEER MANUFACTURER OF CLOSED CELLULAR RUBBER

RUBATEX CLOSED CELLULAR RUBBER

Predicting Cooling Tower Performance

WESLEY W. SMITH
Associate Research Engineer
Texas Engineering Exp Sta
Texas A & M College, College Sta. Tex.

A valuable contribution to the conservation of dwindling water supplies in industrial and metropolitan centers is provided in this paper by Mr. Smith, which emphasizes methods to facilitate prediction of the approximate production of counter-flow cooling tower performance. Early systems using water as a coolant were wasteful. The modern cooling tower discussed here uses a circulatory water system to cool air drafts for ventilating and cooling systems. It conserves at least 80 percent of the original outlay of water.

THE need for closer evaluation and prediction of mechanical draft cooling tower performance is becoming more noticeable as more and more installations are being put into operation. Some of these installations cost hundreds of thousands of dollars. While many manufacturers have the experience and knowledge needed to build equipment that meets specified requirements, the fact remains that there are many towers in operation today that have never been able to meet their performance specifications.

The many variables (some controlled, others uncontrollable in actual operation) make the determination of the performance, even at a given time, a difficult task. The prediction of operation under other than tested conditions becomes still more difficult, and might be practically impossible with any degree of assurance were it not for the evolution and development work by Robinson[1], McAdams[2], Merkel[3], Nottage[4], Lichenstein[5], and others whose academic considerations of a correlation method were used as the basis for the approximate method described in this paper.

Cooling Tower Approach Curves

Fortunately, the most important external factors bearing on the performance of a counterflow cooling tower have been grouped so that their effects are determined from solution of the equation:[6]

$$\frac{KaV}{L} = \int_{t_1}^{t_2} \frac{dt}{h'' - h_a} \quad \ldots\ldots\ldots\ldots (1)$$

in which

K = water evaporated, pounds per (square foot of exposed surface) (hour) (unit vapor content differential).

a = exposed surface area, square feet per cubic foot of active tower volume.

V = active tower volume, cubic feet per square foot of tower ground area.

L = water flowing through the tower pounds per (hour) (square foot of ground area).

G = dry air flowing through the tower pounds per (hour) (square foot of tower ground area).

t_1 = temperature of the water entering the tower, Fahrenheit.

t_2 = temperature of the water off of tower, Fahrenheit.

t = temperature of the water in the tower, Fahrenheit.

h'' = enthalpy of saturated air at temperature t, Btu per pound of dry air.

h_a = enthalpy of air stream in tower at position where water temperature is t, Btu per pound of dry air.

Fig. 1, constructed from this equation, represents the currently usable values of KaV/L and L/G for sea level operation at a wet bulb temperature of 70 F and a range of 20 deg. The circled points were obtained from tests of an 8- by 8-ft experimental tower, while the dotted line represents the probable tower characteristic curve. Fig. 2 contains the same information as Fig. 1 plotted on logarithmic scales for KaV/L and L/G. The tower characteristic curve appears in Fig. 2 as a straight line whose equation can be written:

$$KaV/L = 1.14\ (L/G)^{-0.56} \quad \ldots\ldots (2)$$

from which

$$KaV = 1.14\ L^{0.44}\ G^{0.56} \quad \ldots\ldots (3)$$

Tower Curve Established

As no pattern has yet been discovered to explain the value of the multiplier or the exponents, a tower curve must be established by actual test. Fortunately, the majority of actual towers appear to have characteristic curves that are very nearly straight on logarithmic paper and therefore two points will suffice to establish the line for a reasonably accurate performance criterion.

When a tower curve has been established, prediction of tower performance becomes a matter of superimposing this curve over the proper set of approach curves. Unfortunately approach curves are not at present available for all the conditions encountered, and probably will not be obtained except by some cooperative effort of those who require them. If curves were constructed for each 2-deg interval of range from 8 F to 50 F, and for wet bulb temperatures in 2-deg intervals from 32 F to 90 F. the result would be 660 drawings of approximately 40 curves each. If this construction were completed now for 1000-ft intervals of elevation up to and including 10,000 ft, the number of drawings would become 7260.

Figs. 2, 3, 4, and 5 are presented as an approximate solution to the problem covering 55 F to 85 F wet bulb temperature, 10- to 30-deg range, sea level to 8000-ft elevation, and L/G ratios between 0.5 and 2.0. All prediction calculations are based on sea level performance with 70 F

1. The Design of Cooling Towers, by C. S. Robinson (*ASME Transactions*, Vol. 44, 1922, p. 669).

2. *Principles of Chemical Engineering*, by W. H. Walker, W. K. Lewis, W. H. McAdams (McGraw-Hill Book Co., Inc. New York, 1927).

3. Verdunstungskuhlung, by F. Merkel (*DVI Forschungsarbeiten*, No. 275, 1925).

4. Merkel's Cooling Diagram as a Performance Correlation for Air-Water Evaporative Cooling Systems, by H. B. Nottage (ASHVE TRANSACTIONS, Vol. 47, 1941, p. 429).

5. Performance and Selection of Mechanical Draft Cooling Towers, by Joseph Lichenstein (*ASME Transactions*, Vol. 65, 1943, p. 779).

Reprinted from paper presented at 60th annual meeting of The American Society of Heating and Ventilating Engineers, Houston, Texas, January, 1954.

6. HEATING VENTILATING AIR CONDITIONING GUIDE, 1953, p. 776.

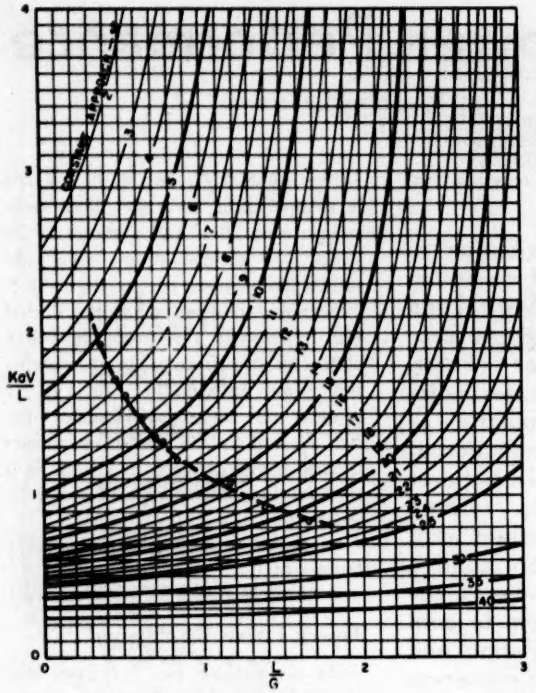


Fig. 1—Cooling tower approach curves (70 F wet bulb with 20 F range at sea level barometric pressure)

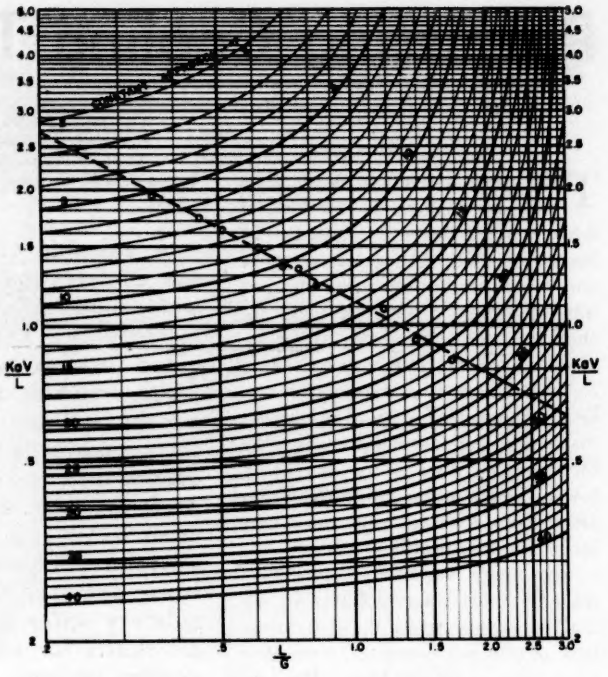


Fig. 2—Cooling tower approach curves (70 F wet bulb with 20 F range at sea level barometric pressure)

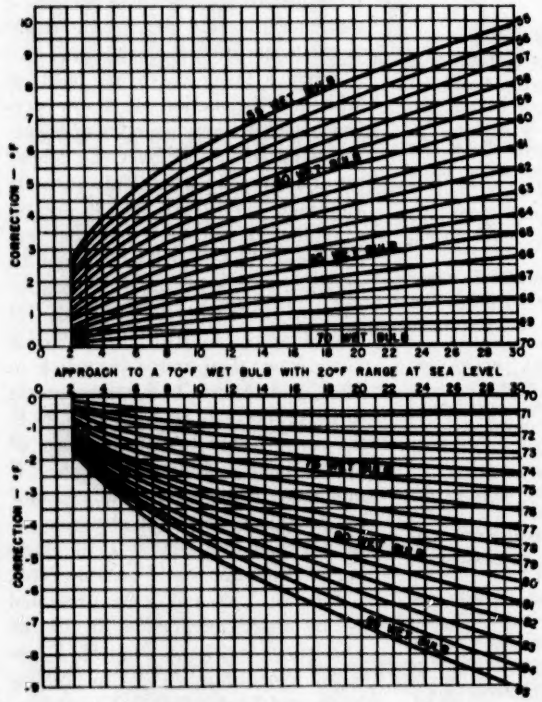


Fig. 3—Wet bulb temperature correction (to be applied to the approach to a 70 F wet bulb with 20 F range at sea level barometric pressure)

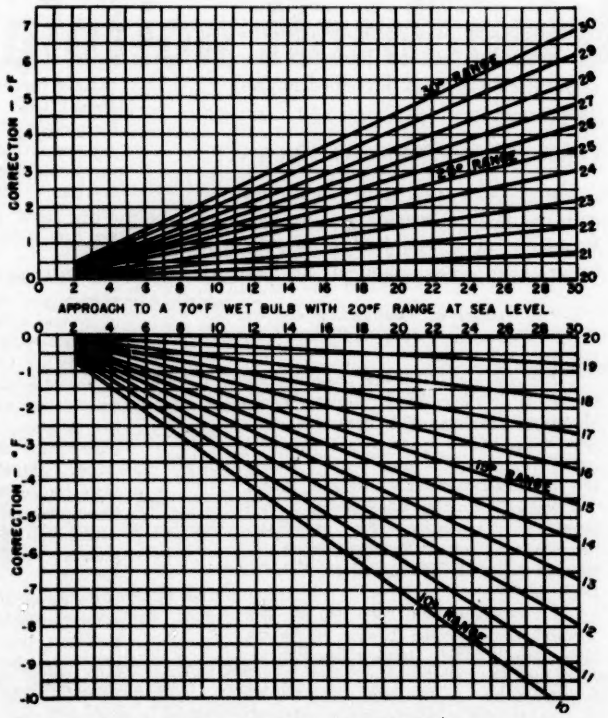


Fig. 4—Range correction (to be applied to the approach to a 70 F wet bulb with 20 F range at sea level barometric pressure)

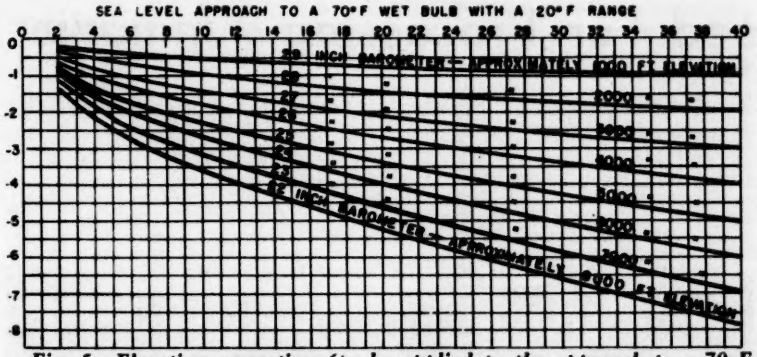

SEA LEVEL APPROACH TO A 70°F WET BULB WITH A 20°F RANGE
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40
0 -1 -2 -3 -4 -5 -6 -7 -8
INCH BAROMETER = APPROXIMATELY 1000 FT ELEVATION
2000
3000
4000
5000
6000
7000
8000
SEA LEVEL BAROMETER = APPROXIMATELY 29.900 IN. MERCURY

Fig. 5—Elevation correction (to be applied to the approach to a 70 F wet bulb with 20 F range at sea level to find the approach for other barometric pressures)

wet bulb temperature and 20-deg range. Proper corrections for wet bulb temperature, range, and elevation are applied to the approach under these conditions to compensate for different wet bulb temperatures, ranges, and elevations. The following example will serve to clarify the method:

Example 1: The experimental tower with the characteristic curve of Fig. 2 is to operate at an L/G of 1.20 at 7000-ft elevation, with a wet bulb of 62 F, and with a 25-deg range. Determine the inlet and outlet water temperatures.

Solution:

Item 1. Approach obtained from Fig. 2 for L/G of 1.2 = 16.1

Item 2. Correction to approach of *Item 1* from Fig. 3 and 62 F = + 4.0

Item 3. *Item 1* plus (algebraically) *Item 2* = 20.1

Item 4. Correction to approach of *Item 1* from Fig. 4 and 25 deg = + 2.0

Item 5. *Items 3* plus (algebraically) *Item 4* = 22.1

Item 6. Correction to approach of *Item 1* from Fig. 5 and 7000 ft = − 4.1

Item 7. *Item 5* − *Item 6* = 18.0

Item 7 is the required approach = 18 deg.

The temperature of water leaving tower = sum of wet bulb temperature, 62 F, and 18 deg approach = 80 F.

The temperature of water entering tower = temperature of water leaving tower + range = 80 + 25 = 105 F.

Air Flow

All preceding calculations have been based on the assumption that the same L/G could be maintained even for significant changes in air density resulting from large changes of elevation. For the same water loading, L/G can be maintained constant at altitudes, but this necessitates a change in fan characteristics and an increase in horsepower. If the altered combination has the same efficiency as the sea level installation, then it can be shown that under certain idealized conditions for constant G:

$$P_x = P_o\ (\rho_o/\rho_x)^2 = P_o\ (V_x/V_o)^2 \ldots (4)$$

or for same temperature and relative humidity:

$$P_x = P_o\ (B_o/B_x)^2 \ldots\ldots\ldots\ldots (5)$$

where

P_x = horsepower at altitude x.
P_o = horsepower at sea level.
ρ_o = air density at sea level.
ρ_x = air density at altitude x.
V_x = air specific volume at altitude x.
V_o = air specific volume at sea level.
B_o = barometric pressure at sea level.
B_x = barometric pressure at altitude x.

The horsepower for *Example 1* would be:

$$P_{7000} = P_o\ (30/23)^2 = 1.7\ P_o$$

This 70 percent increase in horsepower, in addition to being a considerable first cost item, would also mean a considerable increase in operating expense. Therefore, the advisability of using a smaller quantity of air, G, should be investigated.

The expected relation for horsepower as a function of G and ρ is:

$$P_x = P_o \left(\frac{G_x}{G_o}\right)^3 \left(\frac{\rho_o}{\rho_x}\right)^2 \ldots\ldots\ldots\ldots (6)$$

For constant temperature and humidity this would become:

$$P_x = P_o \left(\frac{G_x}{G_o}\right)^3 \left(\frac{B_o}{B_x}\right)^2 \ldots\ldots\ldots\ldots (7)$$

If in *Example 1* the horsepower were kept constant, (the fan would, in all probability, require alteration), the air flow at 7000 ft altitude would become:

$$G_{7000} = G_o\ (23/30)^{3/2} = 0.84 G_o$$

With a constant water loading, this would result in a change from a value of L/G of 1.20 to a value of 1.43. The example tower would have an approach of 20.6 deg. It should be noted that this approach is better than the 22.1 deg approach of the same tower with the same horsepower operated at sea level.

The horsepower required to maintain the same volumetric rate of flow at 7000 ft, as at sea level, would be:

$$P_{7000} = P_o\ (\rho_x/\rho_o) = 0.77\ P_o$$

The resulting G and L/G for constant water loading would be, respectively, $.077 G_o$ and 1.57. The 7000-ft tower would have an approach of 21.9 deg which is practically the same as the 22.1 deg of the sea level tower. Note that it is also probable that no change in fan characteristics would be necessary for this operating condition.

Conclusions

The tower evaluation method described involving the expression,

$$\frac{KaV}{L} = \int_{t_2}^{t_1} \frac{dt}{h'' - h_a}$$

has been found to give reasonably good results although influenced by factors which at present either are not recognized or whose influences are not adequately evaluated. Construction and wide distribution of a complete set of graphs similar to Fig. 2 would naturally lead to better understanding of cooling tower phenomena; improve the customer-manufacturer relationship; and tend to minimize unethical practices.

The approximate method of tower evaluation described herein and involving the use of Figs. 2, 3, 4, and 5, although admittedly rough, nevertheless is probably much better than the methods usually used by the cooling tower operator. The altitude analysis is idealized but based on sound fundamentals and therefore is believed to be generally correct. Until experimental verifications of altitude effects are obtained, the foregoing can serve as a guide to cooling tower performance at elevations.

The improvement in tower performance with increase in altitude is considerable if the same weight of air is handled. However, as this involves a significant increase in fan horsepower for large altitude increases, a reduction in the value of G may be advisable with either a similar reduction in L to maintain a constant L/G or with an unchanged L resulting in an increase in L/G. *Example 1* discussed in this paper is interesting especially in illustrating that virtually the same performance was expected for a 7000-ft elevation

(Continued on page 51)

Refrigeration Used For Processing Ammonia

AMMONIA has many important uses for mankind, but its greatest benefit lies in the fact that it is rich in all important nitrogen. Without nitrogen compounds, all life would perish. Already food production in many areas of the world is declining, owing to an inadequate supply of nitrogen compounds. Nature cannot replace this life-giving material as fast as it is being used to grow more crops to feed ever growing populations.

Ammonia Industrial Uses

By 1939, a half million tons of ammonia were being used annually in the United States for the manufacture of fertilizers. In 1955, an estimated 2,500,000 tons will be used for this purpose. While 70 per cent of the ammonia produced today is consumed in fertilizing our soils, this chemical has a variety of other applications; in refrigeration, petroleum refining, processing paper pulp, and making dyes, synthetic fibers and nitric acid for explosives. A small fraction still goes for smelling salts.

A portion of the output of the new Shell Chemical Corp., Ventura, California ammonia plant will be used in refrigeration. Practical refrigeration engineers will be interested in the manufacturing process of this type of refrigerant, and in the fact that refrigeration is used in three of the process steps.

The process used to manufacture ammonia at the Ventura Plant can be divided into three major steps: gas manufacture; gas purification and compression; and ammonia synthesis. Fig. 2, a block flow diagram, illustrates these three steps.

Members of Los Angeles Chapter NAPRE toured the new Ventura plant, Shell Chemical Corporation in April. NH_3 manufacturing, which they witnessed, is described in a brochure published by Shell, from which information for this article is taken. Technical assistance with the article was furnished by Shell's J. E. Toevs, district manager, Los Angeles, and F. D. Kuenzly, Plant manager, Ventura.

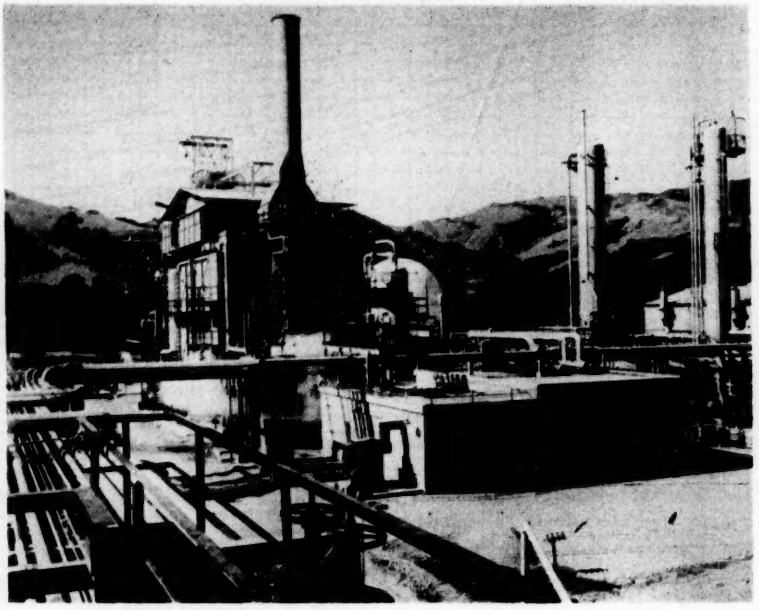


Fig. 1 — Reform furnace and control building, Shell (Ventura) NH_3 plant. Air is introduced to primary reformed gas for crude synthesis gas.

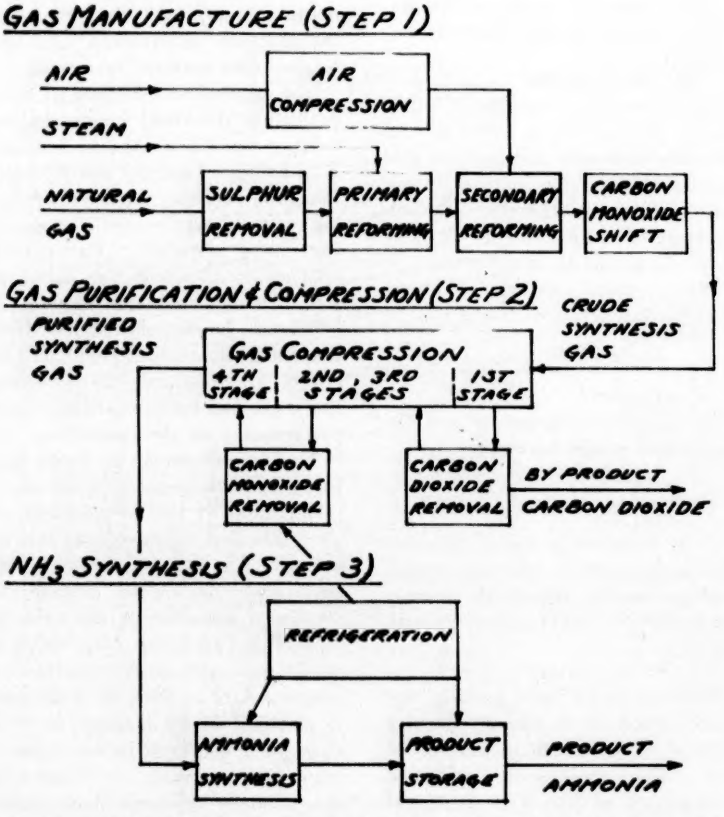


Fig. 2 — Block flow diagram of NH_3 manufacture. More important segments of the three major process steps are shown.

Gas Manufacture

Ammonia is made from 3-to-1 hydrogen-nitrogen mixture. Production of this mixture of hydrogen and nitrogen from natural gas (methane), steam, and air is accomplished in the *reforming area* of the plant. The natural gas is first preheated and catalytically freed of sulphur com-

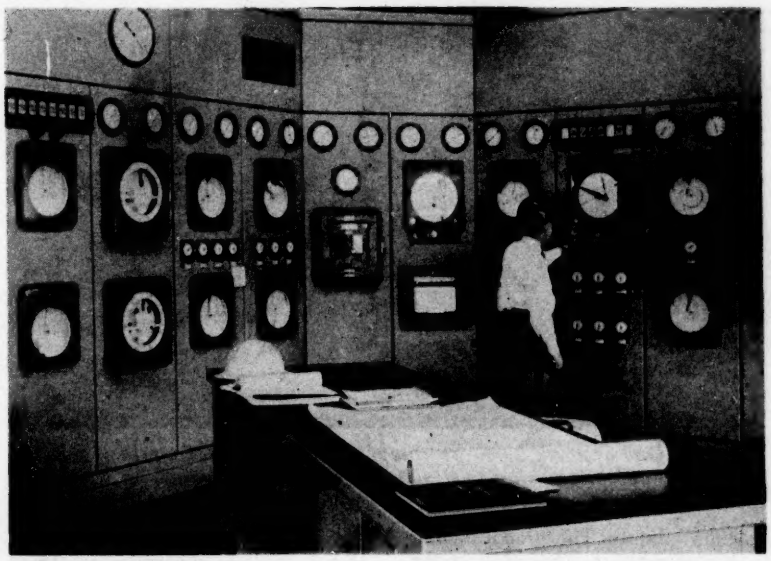


Fig. 3 — Portion of instrument board in plant control house pictured in Fig. 1 — Gauges and recording meters keep operators informed of gas pressures and temperatures at each process step in NH_3 manufacture.

pounds, which are poisonous to catalysts used in subsequent process steps. Then, in the steam-methane reforming operation, the natural gas and an excess of superheated steam are reacted at 1400 F in vertical, externally-fired tubes filled with a nickel catalyst to produce a gas containing hydrogen, carbon monoxide, carbon dioxide and unconverted methane.

Next, air is introduced to supply the nitrogen needed for ammonia systhesis; the oxygen present in the air burns with the unconverted methane at 1600 F. This secondary reforming takes place in a combustion chamber (Figs. 1 and 3). The final reaction in the *reforming area* occurs in the shift converters where most of the carbon monoxide formed in previous reactions is "shifted" to carbon dioxide by reaction with steam at 750 F over an iron oxide catalyst. More hydrogen is produced by this reaction.

Reactions taking place may be summarized as follows:

Reforming:

$CH_4 + H_2O + \text{Heat} = CO + 3H_2$

$CH_4 + 2H_2O + \text{Heat} = CO_2 + 4H_2$

Combustion:

$CH_4 + O_2 = CO + H_2 + H_2O + \text{Heat}$

CO Shift:

$CO + H_2O = CO_2 + H_2 + \text{Heat}$

Steam used in these reactions is produced by boilers (Fig. 4) obtaining waste heat from the primary reformer furnace stack gas and the hot process gas leaving the shift converters. The crude synthesis gas mixture as it leaves the *reforming area* contains hydrogen, nitrogen, carbon dioxide, carbon monoxide, small amounts of residual methane, and argon introduced with the air.

Gas Purification and Compression

Purification of the crude synthesis gas is accomplished concurrently with four stages of gas compression (see Fig. 6) and consists of the removal of carbon dioxide and carbon monoxide. These impurities are also removed to a few parts per million in the purified gas since they poison the ammonia synthesis catalyst.

Carbon dioxide is removed between the first and second compression stages by scrubbing the gas with a solution of monoethanolamine in an absorption column (see Cover). Operation of the absorper at 200 psig. and 100 F allows nearly complete removal of carbon dioxide. Regeneration of the "fat" monoethanolamine solution is accomplished by reducing the pressure and heating the solution in a stripping solumn. The almost

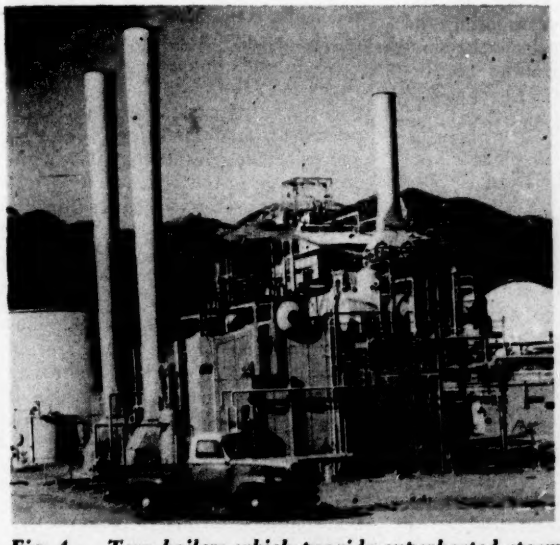


Fig. 4 — Two boilers which provide superheated steam for primary reforming and subsequent process steps. Heat for the boilers comes from reformer furnace stack gas and hot process gas.

Fig. 5 — Refrigerated storage sphere for liquid NH_3 (50 psig & 34 F). This unit is at Kerman, Calif. with two others at the Ventura plant site.

pure carbon dioxide released from this operation is suitable for use in dry ice manufacture.

Process Refrigeration

Carbon monoxide is removed in a purification unit similar to that used for carbon dioxide removal. The gas is scrubbed with a refrigerated copper ammonium acetate solution at about 2000 psig., the pressure between the third and fourth compression stages. Carbon monoxide, removed from the solution in a stripping column, is burned in the boiler fire boxes.

Final traces of carbon dioxide are removed in a small scrubbing tower with caustic soda. As the purified gas bubbles through dilute caustic in the bottom of the scrubber, the carbon dioxide is converted to sodium carbonate.

The purified synthesis gas as it leaves the *purification area* is ready for the fourth and final stage of gas compression from 2000 psig. to 4700 psig., the synthesis system pressure.

Ammonia Synthesis

The synthesis feed gas must contain hydrogen and nitrogen in a three-to-one ratio since the ammonia reaction proceeds as follows:

$$N_2 + 3H_2 = 2NH_3 + \text{Heat}$$

At equibilibrium, which is the state the reactioin would attain if given unlimited residence time, the concentration of amonia in the fully reacted gas is approximately 30 percent by volume at normal operating conditions of 4700 psig. pressure and 900 F. In the plant, where the synthesis gas is passed through beds of a promoted iron oxide catalyst, the conversion is about 60 percent of the equilibrium conversion in one pass through the converters. The ammonia formed is condensed from the gas and separated, and the unreacted gas is recycled to the catalyst.

To determine the best operating conditions at which to carry out the synthesis reaction, the following variables must be considered. catalyst activity, pressure, temperature, contact time, and concentration of inerts, consisting of methane and argon which accumulate in the systhesis circulating gas.

The reaction rate varies directly with the catalyst activity. Activity of a catalyst normally declines with age. Overheating and poisons such as oxygen compounds hasten the activity decline and must be avoided.

Vessel Construction and Cost, Limit Pressures

Increasing pressure increases the equilibrium ammonia content of the reaction mixture. The practical limit to higher pressure operation is the pressure rating of the vessels and cost of compression.

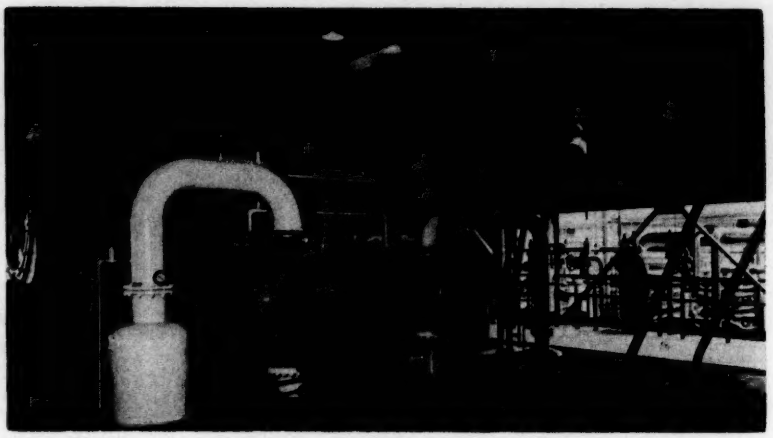


Fig. 6 — One of three 2,000 hp compressors which raise synthesis gas to 5,000 psig during final major step in NH_3 production.

The equilibrium ammonia concentration in the product gas decreases when the temperature is raised, while the reaction rate increases with the temperature. Therefore, an optimum temperature exists for any given set of operating conditions. Increasing the temperature above this optimum reduces production because equilibrium becomes unfavorable, while decreasing the temperature reduces production because the reaction rate becomes too slow.

As the rate of circulation of the gas over the catalyst increases, reducing the contact time, the conversion per pass will decrease but not in direct proportion to the contact time. For example, cutting the contact time in half by doubling the circulation rate may drop the conversion from 25 percent to 20 percent. Since twice as much gas passed over the catalyst, the actual production will increase.

Inerts Continuously Bled

The synthesis feed gas contains inerts such as methane and argon. The methane results from incomplete conversion of the natural gas; the argon is introduced with the air. As the hydrogen and nitrogen are used up to form ammonia, these inerts build up in the circulating gas. As the concentration of inerts increases, the hydrogen and nitrogen concentration must decrease to maintain the same system pressure. Thus, the inerts interfere with the synthesis reaction and must be bled off continuously to control their concentration.

The anhydrous ammonia product, after it is condensed from the circulating gas stream, is sent to large storage spheres (see Fig. 5). Ammonia in these spheres is stored as a liquid at about 50 psig. pressure and 34 F. From the spheres, the ammonia is pumped into tank cars, each with capacity for 25 tons ammonia, which carry the product for distribution to various agricultural and industrial users.

Indian Official Seeks More Refrigeration Imports

THE GOVERNMENT of India should further liberalize imports of refrigeration items such as compressors, automatic controls and raw materials which cannot be manufactured in the country according to J. C. Kapur, presiding over the annual meeting of the Refrigeration and Air Conditioning Trades Association in Bombay. The industry has already reached a stage when standardization of the locally manufactured equipment would increase public confidence, Mr. Kapur said.

He also suggested that as far as possible manufacturing interests utilize existing trade channels in the country so as to give dealers an opportunity to sell goods of local manufacturers. Referring to the Five-Year Plan, Mr. Kapur stated that the industry should utilize fully the opportunity presented by it. He urged the Government to recognize the services rendered by the trade and to make it a part of the light industries section of the Second Plan so that it could grow in an organized manner.

Packer Adds Aging Cooler

AN ADDITION to its meat packing plant costing $65,000 is being constructed by the Plat Packing Company, Denver, Colo. It will house a new aging cooler and a sharp-freeze department.

Seagoing Refrigerated Trucks Haul Perishable Cargo to Alaskan Ports

VARIOUS modes of "piggy-back" transportation have attracted not only attention of the general public, but freight and refrigeration personnel as well. Prior to World War 2, on the east coast of the United States, Seatrains were employed carrying 100 railroad boxcars in the West Indies-Gulf ocean trade. Currently, local truckers and railroads are making commercial news in the larger daily newspaper with truck and railroad flat car combination services, where trucks are loaded on flat cars for over-night destinations, and unloaded for door deliveries the following day.

Fig. 1 — One of 5 electrified barges operated in Alaskan refrigerated produce trade. Caterpillar Diesel-electric sets furnish power for refrigeration units in trailers and vans.

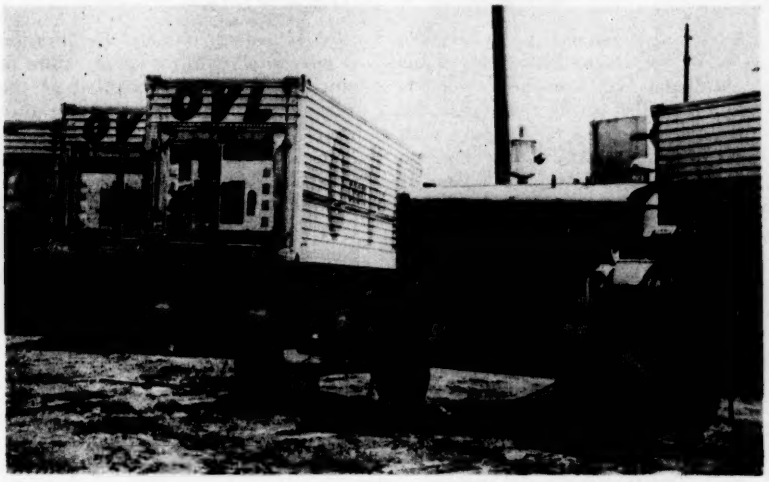


Fig. 2 — Mobile portable Caterpillar D13000 generating sets used for powering Thermo-King truck refrigeration units on pier lots at Seattle. Semi-reefer units operate practically without electrical interruptions from shipping point to destination.

The West Coast has its current equal. Alaska Freight Lines, Inc., Seattle, Wash. is attracting considerable attention in its specialized handling of perishable cargo for various Alaskan ports.

This freight line operates a fleet of eight Miki-Miki type ocean-going tugs and a fleet of towed barges out of Seattle. The 2,000-ton barges, five of which are currently electrified for special cargo handling are ship-shaped BCL type, 204 x 45 x 6 feet. General freight is loaded into three holds on the barges. The deck load consists of loaded semi-truck-trailers and/or refrigerated van boxes which were designed to supply the Alaskan trade with perishables (Fig. 1).

The semi-trailers are 40-footers with wheels attached, and are equipped with 7 kw heaters for winter use when needed. The 30-ft. refrigerated van boxes are equipped with Thermo-King refrigeration units, driven by a 5 hp, 220-volt, 3-phase motor on the compressor and two 3/4 hp motors on blower fans. Automatic temperature controls maintain any

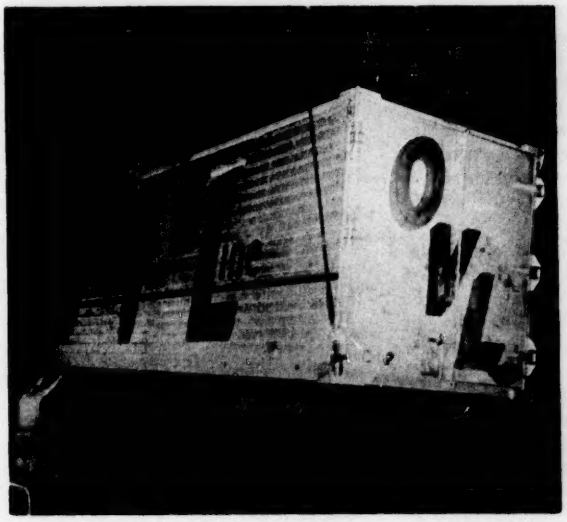


Fig. 3 — Loading reefer-van-boxes on Alaskan Freight Line barge. Van unit is plugged into barge electric system for operation at sea.

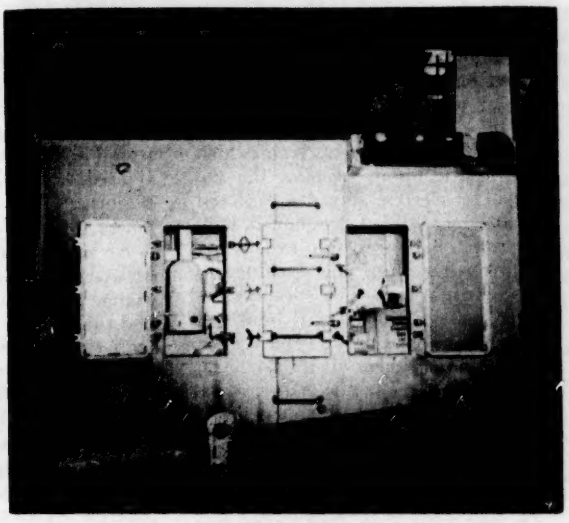


Fig. 4 — Diesel-electric set and all-welded water-proof housing forward on barge deck. Two such houses and sets, each provide 83 kw 220-440, 3 phase current.

desired temperature from zero degrees to 80 degrees at outside temperatures carrying from 60 degrees below zero to 100 degrees above.

Barges "Piggy-Back" Refrigerated Trailers

A full deck load consists of 36 refrigerated van boxes, double-decked. These van boxes are usually loaded by the shippers and then hauled to the loading dock where portable Diesel-electric sets are plugged in to bring the van box with its cargo down to the desired temperature (Fig. 2).

At sailing time, the boxes are lifted aboard the electrified barges by Diesel-powered cranes (see Fig. 3) and then are plugged into the barge's electrical system. Barge system is completely automatic, consisting of two 83 kw, 220-440 volt, 3-phase, radiator cooled, self-regulated Diesel-electric sets, installed on the main deck forward (Fig. 4). The boxes are then ready for the six-to-eight day trip across the Gulf of Alaska, unattended. At Alaskan port destinations, the boxes are reset on trailers for overland delivery.

Barge Generating Sets

Electric sets on the barge are equipped with standard gasoline starting engines for operation in the extreme Alaskan climate. They are equipped with necessary safety devices for low lube oil pressure or high water temperature, and protected by CO_2 fire fighting system and spark arresting mufflers. An additional ten gallon lube oil capacity has been added to the crankcases, and a 30-gallon makeup water tank has also been added.

The fuel system consists of a 2,400 gallon tank directly below the engines under the main deck. An auxiliary fuel oil pump picks up the fuel oil to a 50 gallon day tank, mounted in the engine compartment, from which the transfer pump supplies the engine. The electric sets are enclosed in watertight welded steel houses with the radiator blower fan exhausting aft through appropriate openings in the watertight houses. A specially designed pagoda-shaped air intake is baffled to prevent spray entering the engine compartment (Fig. 4). The electrical system on the barge is installed in an approved manner, using Navy standard waterproof cable connected to outlet boxes mounted on deck in convenient locations for plugging in the individual van boxes.

Eight Day Voyage

Since the trip takes from six to eight days with the barges unattnded, the engines have been equipped with transfer switches that will automatically transfer the load to the other engine in the event one engine should stop. A warning light will come on if either or both engines fail, and this light is so arranged that it can be seen from the tug towing the barge.

Originally, Alaska Freight Lines loaded its semi-trailers with dry ice to hold perishables for the trip from Seattle to Alaskan ports by barge, then over highway to final destination points. Now, however, they are not used for the perishables. Alaska Freight Lines, incidentally, acquired its reefer trucks from a former competitive line which had been using them in regular ocean-going ships rather than in barges.

Captain Martin Guchee is vice-president and operating manager of Alaska Barge Lines, and Jack Grabler port engineer for Alaska Barge Lines. Engineering was by Carl Nordstrom, naval architect. D. E. Erickson, manager, and Ellsworth Seaton, Marine Division, Northern Commercial Co., were the installation contractors.

Removal of Peel Oil From Refrigerated Canned Orange Juice

AN investigation was undertaken by the research division of the Continental Can Company to determine the effect of the removal of the peel oil at the time of canning with subsequent reconstitution at the time of consumption on the flavor of canned single strength orange juice. Results indicate that the flavor of orange juice packed with a very low oil content deteriorates as rapidly as that of orange juice packed with a normal oil content and that the addition of peel oil at the time of consumption slightly improved the flavor.

The temperature of storage was found to be the most important single factor in preventing the deterioration of the flavor of canned single strength orange juice. Storage temperature was found to be the most important factor in maintaining the flavor of single strength orange juice over a prolonged storage period. The flavor of the canned orange juice, stored at room temperature, deteriorated rapidly from a rating of good, one month after packing, to a rating of poor to extremely poor, at the end of nine months. At this point the variables stored at room temperature were considered to be unmerchantable by a majority of the members of the taste panel.

No significant difference was noted between the flavor of the canned orange juice stored at minus 10 F. and that stored at 35 F. However, in both cases there was a gradual deterioration of the flavor over a twelve-month storage period from very good to slightly above average.

These results are in agreement with the investigations of Boyd and Peterson who state that storage temperature of canned orange juice is a very important factor in the prevention of loss in flavor. Riester, Braun and Pearce also state that the rate of general quality deterioration is correlated with the temperature of storage. The flavor ratings of the variables stored at room temperature were taken from the one and nine months examinations. At the end of nine months.

When the samples were tasted before adding the peel oil, those samples containing 0.0125 percent and 0.0095 percent peel oil were rated higher than the lowest oil-containing sample (0.0016 percent) and the oil-free juice. The addition of peel oil at the time of tasting did improve the flavor, but the resulting rating was far below that of the control stored at 35 F. It was the opinion of the panel that added peel oil tended to mask the off-flavor. However, as the flavor deterioration became more pronounced the off-flavor could easily be detected.

Samples from hand-peeled fruit which had no detectable oil content deteriorated at a rate similar to the variable containing 0.0016 percent peel oil. In both cases the addition of peel oil at the time of consumption did improve the flavor, but did not bring it back to the level of the control stored at 35 F.

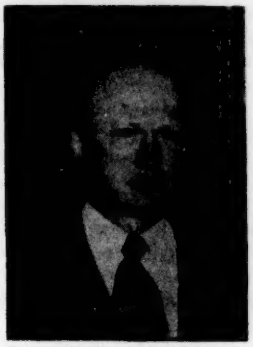
Effect of Peel Oil on Deterioration

This investigation has shown that flavor of canned single strength orange juice stored at room temperature continued to deteriorate as rapidly with only 0.0016 percent peel oil present as it did with 0.0125 percent peel oil present. In addition, it has shown that the addition of cold pressed orange oil to a low oil-contaminating sample at the time of consumption did improve the flavor over that of a sample containing a normal amount of oil during the storage period.

Air Recovery Suggested for Economical Air Conditioning Operation

HOMER M. BIRD*
Consulting Engineer
Minneapolis, Minn.

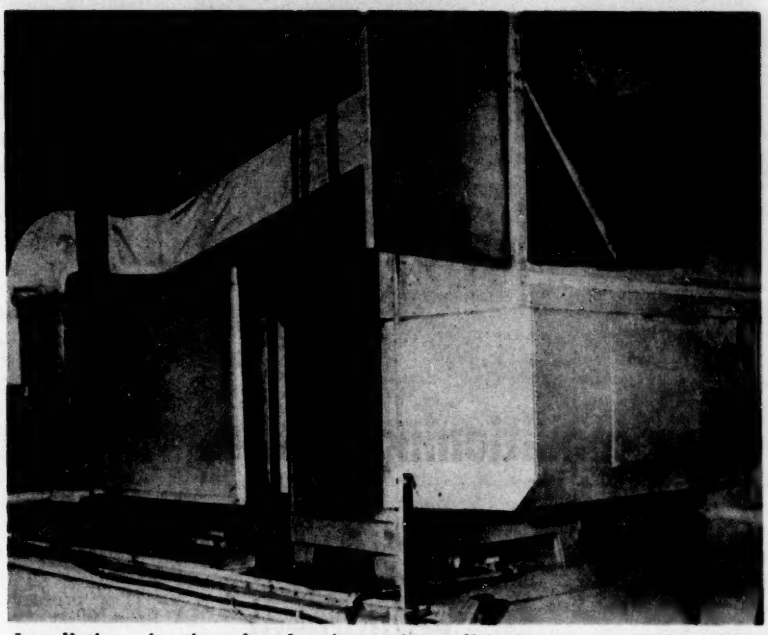
SUPERVISING engineers of larger operating chains, especially of hotels, institutions, and public buildings, are quite often relied on by consultants to provide operating budgets for proposed installations.



Homer M. Bird

In turn, they are informed of new economy developments which the design engineers' experience and wider diversifications of contacts provided. Air recovery is one that is well worth careful consideration.

*The author is current president of the Minnesota Association of Consulting Engineers. Among his more recent air conditioning installations are: Northwest Security National Bank, a 75-ton plant, and the State Penitentiary of South Dakota, both of Sioux Falls, S. D.; an 80-ton plant at the Bell Telephone Exchange Building, Aberdeen, Minn.; at St. Louis Park a 100-ton installation for Reinhard Brothers, Wholesalers. All of these projects include activated carbon air recovery in heating and air conditioning systems.



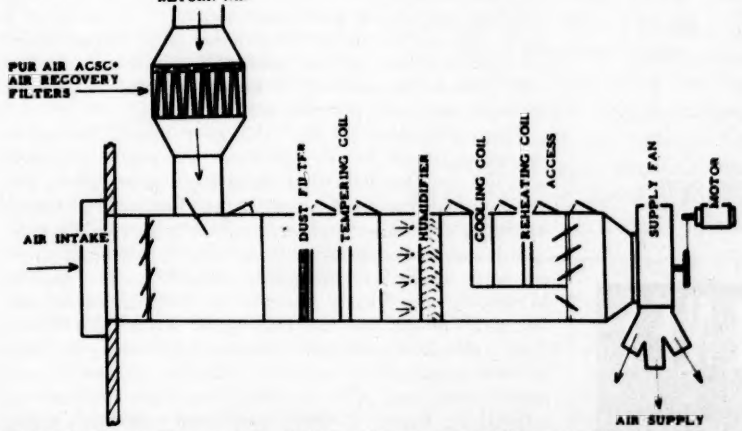
Installation of activated carbon in an air conditioning system. "Filterfolds" containing the carbon (top right) are installed just below the customary dust filter. Air flow passes from top to bottom and into the cooling unit. Activated carbon filters pictured were manufactured by Barneby-Cheney Company, Pur Air Division.

In addition to the problem of designing and producing within the budget, owners first-cost-budget, a system giving the sensible comfort results desired, another equaling it in importance is an operating cost within a budget the owner or user is willing to pay. Planned operating budgets no matter how well set up and accepted, stand the test of actual experience only if the design incorporates maximum results at minimum overall ultimate expense, and performs to that end.

These precepts of design have been brought to compelling attention of the writer by observing on many occasions thousands of dollars worth of good equipment (a goodly portion his own work) standing idle or at best operating with limited results. This regretable condition existed principally because the user could not afford the operating cost of fuel and power, or was not convinced that the maximum results obtainable were worth the cost.

Observation of the actual operating procedure of almost any ten air conditioning systems in any locality picked at random, will serve to convince most any engineer that failure to incorporate certain economical operation aspects is an error of major proportion. This observed mass of idle equipment and inadequate results is not necessarily an indictment of the designing engineers or the contractors involved, but it is a ready object lesson.

Equipment manufacturers of the past decade made available a great many new and improved products and processes; such as temperature control, insulation, double and triple



Typical all-weather system design. Air recovery filter specified in this instance are Pur Air activated cocoanut shell carbon.

of air conditioning Dollars

with Pur Air
equipment

Outside air is expensive to heat or cool. In fact by simply purifying and recirculating air which is already heated or cooled, **you can save 40 per cent or more on the operation of air conditioning equipment.**

It's done by passing the air through Pur Air activated carbon, removing odors and eliminating the necessity for large amounts of outside air for ventilation. **The volume of outside air necessary can be reduced by as much as 90 per cent.**

If a system is designed to use activated carbon, **"first cost" can also be from 20 to 45 per cent lower.**

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sealed glass for windows, matched boiler-burner units, pumps, fans, filters, and many more. Any one or combination of them makes its contribution to the betterment of the system involved. In the writer's experience, air recovery is an important contributor to maximum operating results at minimum ultimate cost in quite a number of air-conditioning systems.

These projects are in various stages of completion, ranging from design to fully installed systems that have operated through several seasons. They have confirmed the reasoning which led to what seemed bold measures of reducing the capacity of the heat generating, air heating, heat removal and air chilling equipment. Equipment size reductions ranged 20 to 45 percent from that which would have been necessary with the conventional volume of outdoor air for odor removal by air change.

This equipment reduction maneuver and its resultant lower initial cost, impressive as it is, still isn't the most compelling reason for using an air recovery. The major contribution attained is operating economy. This results from reducing the volume of outside air taken in for odor removal ventilation, by as much as 90 percent. It naturally follows that fuel and power consumption frequently drop by forty percent, or more. This saving, piling up year after year through the life of use of the system, really pays off in a big way; even though these savings actually experienced have been encumbered with the cost of reactivation, and the additional power consumption required due to more resistance imposed in the air stream by smaller equipment.

The problem of humidity build-up peculiar to the heating season, with long human occupancy of a contained air filled space without air change, is quite simple to deal with successfully. Add a liquid heat-carrying circuit with transfer surface in the outdoor air, to the same subsystem that performs the dehumidifying function during the cooling season. Latest reasoning places this function down air-stream of the filters, and just upstream ahead of the air recovery equipment.

There is a compromise with the operating budget indulged in by engineer, contractor, user and owner that the use of air recovery can often eliminate. It is the use of an ever-decreasing, (even to the vanishing point) volume of outdoor air for ventilation for odor removal. Most reject this trend because it is not progressive thinking, but surrender to it in favor of the operating budget's pressure. Air recovery, when applicable and thoughtfully used, eliminates the need for this surrender by providing constant full volume of odor clean air for ventilation.

It is difficult to summarize in this article detailed design procedures. Every project, or at least each kind of building serving a particular purpose, is peculiar to itself. The prime object is to reduce new unconditioned air volume to the absolute allowable minimum, which in turn reduces the amount of heat that must be pumped in for heating and pumped out for cooling.

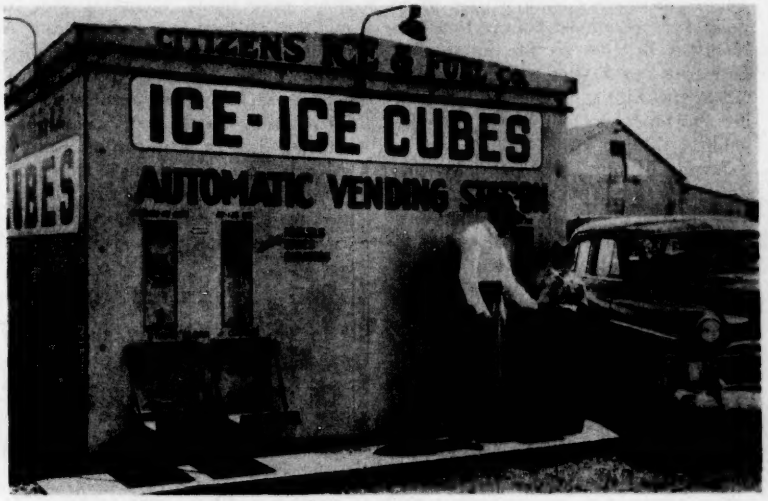
The writer does not hold this as a "pitch" for air recovery as it may fit any particular manufacturer's product. But he does hold that these experiences are a convincing brief for air recovery as an effective tool toward operating economies, and hence owner or user satisfaction.

It is not an exaggeration to say that if this simple process were applied to the public schools in the state of Minnesota, the yearly savings in original equipment, operation power and fuel cost would build a 1500—student high school each year. On a national scope, extended to new construction only in industry, commerce and public buildings, the realizable savings becomes an astonishing figure. It could equal our president's recent proposed fifty billion dollars for national highway construction in the next twenty-five years.

There's Profit in The Ice Business

So Say these successful Ice Companies which reported bigger sales and profits in 1953

EDGAR R. CURRY
Managing Editor
Industrial Refrigeration



Modern Method of Selling Ice — making it available to people when they want it, in the way they want it.

Since the close of the 1953 ice season, reports have come to INDUSTRIAL REFRIGERATION about ice companies in various sections of the country whose operations have been outstandingly successful — in a number of instances showing better profits last year and having a more favorable outlook for the future than for previous years.

HOW Did They Do It?

To answer this question, Industrial Refrigeration asked these men for letters telling the methods used and results achieved. These have been compiled in this article. To any ice company whose sales and profits appear to be slipping, and whose future appears not too bright, we believe this compilation will provide new ideas, pointing the way toward more and better sales for all.

RECENTLY an ice distributor in conversation with others, made the statement that he had had a better year in 1953 than ever before, and that his prospects were bright for a still better year in 1954. There were skeptics in the group. But after he had told his story they were convinced that it could have been possible. It was not only possible, It Did Happen. And here in this compilation are the experiences and methods of a number of successful ice men who had a better year in 1953 and who expect this prosperity to continue through 1954.

What the Customer Wants

The manager of the Koldkist Ice Company, Portland, Ore., attributes his success to using the merchandising material and ideas furnished by The National Association of Ice Industries, and early entry in the sized ice business. Since this company has no other commodity or service to sell besides ice, they have been able to keep control of it until it reaches the ultimate consumer, operating their own delivery and keeping in close contact with the customers. They have always considered it a privilege to serve these customers, and their one aim has been to see that they get ice as they want it.

"Perhaps our whole operation might be summed up in the expression: Give the customer anything he wants, provided he will pay enough for it so there is a profit possible in the transaction," says Lu Marsh, manager. "We have made it a point to see that our employees realize that their jobs depend on their serving the customer in such a way that he is satisfied."

The company started selling sized ice in 1935. First sales were so small that it probably amounted to one or two hundred pounds of ice a day. It was done because the National recommended it — also because some of the route men were already supplying it to a few customers who wanted it, by doing the sizing on their truck with an ice pick.

Sized Ice sales have been increasing every year and in 1953 over 90 percent of the tonnage was in this form. In 1953 tonnage was about 10 percent up over 1952, the same ratio of increase as for a few previous years. But now the business has completely changed — block ice for domestic use has practically disappeared — sized ice to commercial trade, drug stores, restaurants, markets, produce houses, etc. has taken on the load, while sized ice for domestic customers is developing into a nice amount of business and increasing constantly.

Sized Ice is Quality

The manager continues with his story: "Possibly some of our success has been due to our 100 percent use of paper bags for sized ice ever since about 1946 or thereabout. Our sized ice is strictly a quality product, we can truthfully say practically untouched by human hands and absolutely crystal clear, tasteless, sparkling, cold goodness, that makes every food or drink that is not served hot more delicious and attractive.

"Whether or not it has been one of the reasons for our success in holding our tonnage the fact that we have never been afraid to keep our ice prices high enough so we could make a profit from our op-

38—J. K.

eration has certainly been a big factor in our business. We have always believed that quality is more important to the customer than price — in fact we almost believe that two identical articles so far as quality goes with one higher priced than the other, the higher priced article will be accepted as the better by the public.

"Some of our customers have installed on-the-premises ice makers, but for practically all of them there was a temporary decline in the amount of ice they purchased but we find that often they are soon buying as much ice as before. When the conditions of the customer make it an economic advantage to him to purchase ice making equipment we believe it is good judgment to tell him frankly that he should do so, also tell him that when he finds the need of more ice than the machine will produce (which is certain to come, the only question is when and how much) it will be a pleasure to supply him with the extra ice he needs.

"A large part of our business is supplying extra ice to places that have their own ice making equipment. If they did not have their equipment and still use all the ice they do use and bought it from us, it would be very nice — but they would not use as much ice. We do not consider the small ice makers a complete evil, they create the use of more ice which benefits our business directly and indirectly.

Run Down Ice Plant Built into Money Maker

In Tucumcari, N. M., C. A. Meeker a few years ago took over a run down ice plant that had made no profits for 15 years. A program of rebuilding and installation of new equipment was instituted, resulting in much more efficient operation. While tonnage has decreased, sales of processed and vended ice have kept receipts above the profit line.

The operation has been profitable, according to Mr. Meeker as a payoff for hard work and close supervision. He tried to eliminate all inefficiencies, doing all he can with machinery and giving the public what they want. Fourteen vendors are in operation, including four self-contained housed installations and five at the plant, where customers wait on themselves.

New Equipment For Processed Ice

Five or six years ago the management of The Crystal Ice Company, Pensacola, Florida realized that the trend was away from block ice to processed and vended ice. Acting on this, new installations of equipment were made, including that for making crushed ice and cubes. At the same time they began installing ice vendors, on each of which six conveyors are used, serving 25 and 50 pound block ice, cubed ice, crushed ice in waterproof bags, a half-case of canned beer, and half-gallon draft beer. This draft beer is packaged in half-gallon wine bottles with screw caps, packed in crushed ice.

In this report by successful ice companies, one policy, common to all, stands out; that is to make ice available to people where they want it, when they want it, and the way they want it. They report no instances of spectacular or unusual ways of making more profits. Rather it is a record of making use of merchandising aids already known or available, pointed chiefly toward the fulfillment of the above policy.

A beverage department was opened on the platform for beer by the case, different types of soft drinks, ice cream, charcoal and kindling wood. Profits on draft beer sold for home consumption at the plant showed a net profit of approximately $830.00 per month for eight months. They also sold at the platform, thermos jugs and picnic coolers. On weekends they sell as much as 300 cases of Coca-Cola alone. All of the soft drink and beer customers also are ice customers. They have built their platform sales from approximately 500 to between 3,000 and 4,000 customers during the summer months.

This company operates a 75 ton plant and tonnage for the year 1953 was approximately the same as it was for 1952. However, gross profits were greater since they were merchandising packaged ice at a bigger profit. Sales on cube ice alone are increasing from year to year and tonnage averages about 30 to 35 tons per day during the eight month period.

In the last two years the company has installed about 15 to 20 refrigerated ice stations with automatic units at outlying grocery stores and filling stations. These units also sell cold beer and draft beer. Each of these stations is equipped with an ice crusher, a 25 pound unit with motor attached.

Last year the company entered the ice carving business, investing about $3,000 in molds of all kinds and descriptions for all occasions. This has been very profitable and creates extra business that is as large in the winter months as it is during the summer. Company employees do all the installation, including the decorating and the carving, installing of drip pans, lights and the freezing of flowers.

Packaged Ice Builds Business

The packaged ice volume of The Liberty Ice & Fuel Company, Portland, Oregon increased 33 percent over a year ago and in February the increase was 35 percent. This increase in profits, according to L. Kenneth Davidson, company manager, is a result of the policy of giving the people what they want, when they want it and in a better container, and by telling them through advertising where they can get this service.

This company's ice routes take care of only the wholesale customers and only to household customers when service to them does not necessitate extra delivery. Ice stations are placed at central points throughout the city. Not at points on through ways where the traffic is fast but at intersections where there is a stop or slow signal. a chance to see the station and should This gives the prospective customer he want ice it is easier to get out of the traffic and pick it up.

Liberty stations are painted red, white and blue with the sign "ice" in red as large as possible. The automats have a regular billboard sign "Cocktail Ice" painted in red on the sides with the address of the other stations in the vicinity printed on the door by the slots. The A signs are 4 × 4 feet and red, white and blue with "Cocktail Ice" painted as large as possible in red. As an experiment a small red Neon sign was installed on one station. During two months it sold more Cocktail ice than any other.

Location of the stations are advertised in district papers with the name "Cocktail Ice" in large type. The company's name is on the radio daily. Two years ago they started in the furnace and heating service in conjunction with the oil business and now this has developed into the largest heating service department in Portland.

The most profitable part of the ice

MONOPLAST . . . *a new, one-coat insulation finish for cold room walls and ceilings*

Monoplast is an entirely new, light-reflective white finish for cold rooms. Trowelled on in just one coat, it dries to a durable surface for all temperatures to 80° F. below zero. Monoplast reflects 72% of the light that strikes its surface, resulting in an exceptionally bright cold room interior. Its resilience and strength protect the insulation from abrasion. Monoplast is easy to maintain.

A Monoplast finish is completely monolithic, with no score marks to mar its surface. It needs no painting and can be washed with water and commonly used cleaning agents. It weighs only about one-fifth as much as two-coat portland cement plaster and can be applied to ceilings as easily as to walls.

This new finish is available through Armstrong's Contract Service. It is one of the new products of Armstrong's research that are simplifying application methods in the industrial insulation field.

For full details on Monoplast and Armstrong's Insulation Contract Service, call the Armstrong office nearest you or write today to Armstrong Cork Company, 203 Stratton Street, Lancaster, Pennsylvania.

Applied by trowelling, one coat of Monoplast provides a tough, durable cold room finish that will last for many years. Armstrong's Monoplast eliminates the necessity of scoring and painting the walls.

ARMSTRONG'S INDUSTRIAL INSULATIONS

business says Mr. Davidson, the manager, is the premium packaged ice. If you want to make money you have to sell it, he says. He attributes their increase in sales to advertising the fact that the ice is clean, colder, made from drinking water and sold in white bags. The name "Cocktail Ice" has caught on and many people call in and ask the location of a station near their house where they can get "Cocktail Ice". Since they started using white bags they never would dare to go back to old ones. People want a clean product and white dresses up the ice package.

They have also found that people will buy a half-bushel of ice instead of eight pound bags. Last year only eight pound bags were available in the stations. This year they find half-bushel bags outsell the bags five to one and bushel bags are about even with small bags.

Packaged Ice Replaces Domestic Sales

One of the leading Canadian ice companies, Lake Simcoe Ice & Fuel, Ltd. of Toronto, reports that in 1953 domestic tonnage was off considerably, but this was made up in increased sales of packaged ice in both sized and cube form. Over the past four years they have developed a large out-of-town business. They deliver both block and packaged ice to summer resort areas where the ice dealers have ceased harvesting natural ice.

Blue prints are supplied to the dealers for the erection of a small refrigerated warehouse that holds approximately 25 tons of ice. They are also supplying ice to a number of smaller cities where the ice business has been reduced to a point where it is not profitable to operate the plant and ice can be hauled in much cheaper.

In the past two years new buildings have been erected for the storage of frozen foods. Existing compressor equipment was used and vacant property adjacent to the plant was used for the building. Increased sales at vending machines indicate that this is a lucrative market.

Many Things Add Up To Better Business

There is nothing spectacular in the following report of an ice man who has been in business for many years; rather it is a recital of the many things he has done, which together add up to better business.

The Citizens Ice & Coal Company, Mattoon, Ill., was helped considerably in 1953 and also 1952 by favorable weather, and some change in the habits and living conditions of people who seem to be very much on the move and, while they don't want ice in their homes, they do want it with them while they are moving. This is very fine, because they want to come after it, and this makes it possible to keep whittling at a delivery expense total that was reaching toward the sky.

The present condition of the ice industry is not going to allow any fancy dividends to be taken and invested in the common stocks of some more temporarily fortunate corporations. It is going to force ice companies to tighten their belts still another notch and put every dollar of profits, plus what they can safely borrow, back into more outlets, so that people can have ice, how, when and where they want it, says H. R. Tolle, manager.

As far as this operation is concerned it has been a slow process of building. First it meant the elimination of two other plants in Mattoon. This had to be backed with the courage to borrow the money to do it. Next the purchase of a utility plant in neighboring city of 7500 people and putting this load on the two Mattoon plants. This was in 1943. Again in 1950 another 25 ton plant was bought in a city of 3000 and this load was added. This city was at the crossroads of two large railroads, who have always had a fairly steady volume of car icing business.

Another favorable factor has been the location in almost the center of a five county group of 250,000 people. In this area there are some 24 fair sized communities who will always use some ice, and there are another group of 22 villages, which would consume a little ice if they can develop a satisfactory method of handling. They are thinking hard on this, because they believe they must copy the super markets and put ice out where people will stumble over it.

Two plants in Mattoon are being operated with a total capacity of 72 tons a day and storage of 1200 tons. In 1951, both electric driven plants were converted to a semi-automatic operation and the force was cut down from five men, 24 hours a day at each plant to two men at each plant, pulling 16 hours a day and six days a week and getting two thirds of above capacity. This was probably the most profitable money we ever spent.

Mr. Tolle says they bought their first vending machine solely with the idea of eliminating so much platform help. They found that more people started buying ice than ever before, not in tonnage but in unit sales at a high price. So this one has been followed by five more so far with equally good results at all locations. These are being augmented this year with five self built refrigerated stations of 450 cubic feet capacity in smaller towns. They are being placed with the best gas stations all on state highways. This ice delivered to these stations, sacked in refrigerated truck, is going to bring a return close to $30.00 a ton compared to the $10.50 block ice price to same towns.

Perishable freight trucks are finding the Mattoon location attractive and this business has doubled each year, each month over the preceeding year.

Most of those in the ice business, Mr. Tolle believes, have confidence in their ability to carry on, and develop the markets that are left on a much more profitable basis than the old tonnage system. It isn't going to be easy. They will have to choose between golf and ice.

1953 Better Than Any Year Since 1948

For The St. Clair Ice Company, Belleville, Ill., the year 1953 was a more profitable year than any year since 1948. The successful 1953 operation, according to Karl V. Pflanz, manager, was due mainly to the following:

1—Very good ice weather throughout the ice season.

2—Cooperation among employees, giving more production per man hour, which saved employing additional help.

3—Cooperation by engineers in cutting power and water cost by operating compressors at capacity, this being accomplished by putting additional compressors on the line only when needed.

4—Combining ice routes. By combining routes the use of two trucks was discontinued.

5—Advertising was concentrated on sized and cubed ice, both premium items, of which there is good volume.

6—Diversified lines, particularly charcoal and watermelons. Both are very profitable items and without any additional labor 4000 watermelons and several hundred bags of charcoal were sold at retail from ice dock.

Diversified Merchandising Program Pays Off

The most successful financial year H. Brunelle Ltd., Montreal, Canada, ever had was 1953, and they are

(Continued on page 51)

Refrigerated Warehouses Report Storage Space Available For Current Needs

IF THERE is a national shortage of refrigerated warehouse space, it's news to most refrigerated warehousemen. An over-all shortage of storage space for butter, cheese, frozen foods and other perishable foods is a long way off, according to those in the know.

In a national survey completed by the National Association of Refrigerated Warehouses, refrigerated warehousemen reported the immediate availability of refrigerated storage space to accommodate 152 million pounds of freezer products and 100 million pounds of cooler products.

Eighty-one percent of the refrigerated warehousemen polled said they have no shortage of refrigerated storage space now and do not anticipate a shortage developing. Nineteen percent, however, do anticipate that refrigerated warehouse space will be "tight" because of expected heavy seasonal production this fall or for various other reasons. Most of the latter warehouses are located in heavy production areas.

The survey revealed that the present average national occupancy of refrigerated warehouse space is 74 percent for freezers and 67 percent for coolers. The breakdown by regions is as follows:

AVERAGE REFRIGERATED WAREHOUSE OCCUPANCY BY REGIONS

	Cooler (Percent	Freezer (Percent
East	66	75
Southeast	77	74
Central	77	78
Southwest	74	72
West	43	71

Comments From Warehousemen

Here's how the comments ran from refrigerated warehousemen in various States around the nation:

"Over 800,000 cu. ft. of refrigerated storage space added in past year and about 400,000 cu. ft. now under construction. Every public warehouse has either added space or made some coolers convertible". "Temporary and seasonal shortage only, but not as severe as any year in the last fifteen—2,700,000 cu. ft. of new space coming into this area.". . ."Can handle 1,200,000 lbs of freezer products and 4,800,000 lbs of cooler products."—California.

"Under normal operating conditions, there is no space shortage here in either coolers or freezers."—Colorado. "Plenty of freezer and cooler space available.". . . . "Space available for 18,000,000 lbs of cooler products and 10,000,000 lbs of freezer products.". . . ."We have placed new sub-zero degree storage in operation this week, which will give us sufficient space to handle storage requirements in this area."—Georgia.

"Can handle 2½ million lbs of freezer commodities and 1½ million lbs of cooler commodities.". . . ."Due to fast turnover in frozen foods we expect to handle our commitments". . . .Illinois.

"Space for cooler and freezer products available."—Indiana.

"We can upon thirty days notice install necessary floor insulation to make available space for an additional 1¼ million pounds of butter or other freezer products for a total of 4 million pounds available."—Kentucky.

"We haven't turned away anyone in ten years and don't intend to soon.". . . ."We have space available for 1 million lbs of butter, frozen foods or eggs."—Louisiana.

"We can handle 3 million pounds of freezer commodities. . . . . Production peaks result in temporary space shortages — but not for any length of time."—Maryland.

"No space shortage here". "Occasionally have a loaded condition, on a temporary basis,—plent of cooler space available."—Michigan.

"No shortage of space at present—none anticipated.". . ."Presently have storage space for 3 million lbs of freezer products." . . . ."Butter storage space is tight at present."—Minnesota.

"No shortage of cooler or freezer space." . . . ."Ample space for cooler and freezer commodities.". . . ."Space available for all commodities.". . . ."Space available for any type of freezer commodity"—Missouri.

"Have freezer space for 10,000,000 lbs." "Space available for several carloads of most any commodity.". . . ."Space available for almost 2 million lbs of butter as well as frozen foods, meats, etc."—Nebraska

"Plenty of space—both cooler and freezer.". . . ."In our area there is an has been available space for most any commodity."

Can handle 3 million lbs of freezer and 2½ million lbs of cooler commodities. New Jersey.

"No shortage apparent. Believe that local warehouses can adequately handle situation." "We doubt very much that the space situation is as tight as reports would seem to indicate. "In the past we have been able to handle our regular customers during this period and anticipate that we will continue to do so". . ."Cooler space is limited but freezer space is available.". . ."Most warehousemen have space for several million lbs. . . ."Come 'hell or high water', we will take care of our customer's requirements.". . . ."Have space space available for 2 million lbs of freezer products."—New York.

"Can handle 100,000 lbs of freezer products—750,000 lbs of cooler products."—North Carolina

Refrigerated Warehouse Space Increases

REFRIGERATED cold storage warehouses in the United States had a gross capacity of 748 million cubic feet on October 1, 1953, an increase of 37 million cubic feet over the capacity reported on October 1, 1951, according to the results of the seventeenth biennial U. S. Department of Agriculture survey. Almost all of this increase was accounted for by capacity gains in the West North Central, South Atlantic, and Pacific Coast States.

The survey, made by USDA's Agricultural Marketing Service, shows that as of October 1, 1953, freezer space totaled 347 million cubic feet, and cooler space, 401 million cu. ft.

The following table shows a preliminary summary of this biennial survey of the capacity of refrigerated storage warehouses, which are defined as facilities artificially cooled to 50 F. or lower and in which foods are generally stored for 30 days or more.

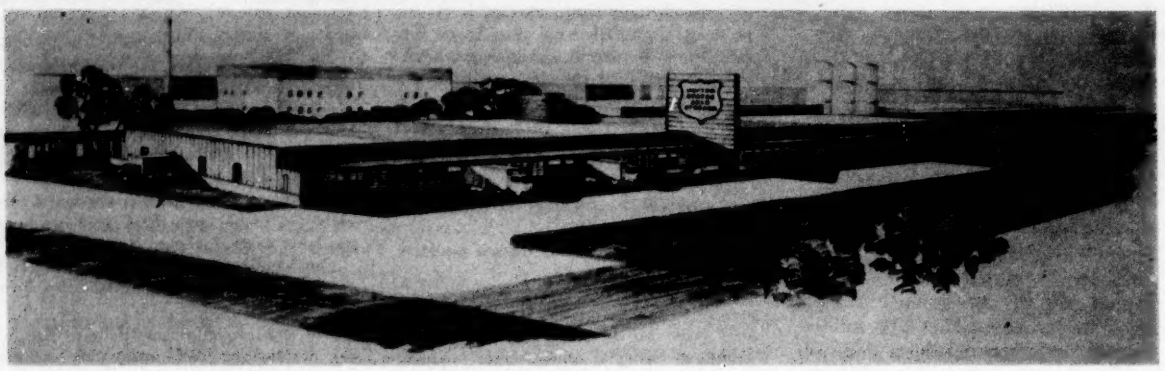
A final report giving warehouse capacity by regions, States, and cities will be issued in September and will be available upon request from the Marketing Information Division, Agricultural Marketing Service, U. S. Department of Agriculture, Washington 25, D. C.

GROSS REFRIGERATED WAREHOUSE CAPACITY, OCTOBER 1, 1953[1]

Type of warehouse business	Freezer	Cooler	Percentage change since 1951 Freezer	Cooler
	Million Cu. Ft.	*Million Cu. Ft.*	*Pct.*	*Pct.*
Public	258	209	plus 17	plus 2
Private and semiprivate	60	142	plus 15	plus 4
Meat packing plant ..	29	50	— 9	— 24
U. S. Total	347	401	plus 14	— 1

[1]The decrease in meat packing plant capacity results from a change in the 1953 survey which excluded curing and smoking room space.

New Refrigerated Warehouse and Freezing Plant for Fort Worth



Architect's drawing of new Fort Worth warehouse and freezing plant of United States Cold Storage Corp.

THE construction of a cold storage warehouse and freezing plant at Fort Worth, Texas is announced by E. M. Dodds, president of the United States Cold Storage Corp. The plant will be located in the stockyards area in Fort Worth on northeast 23rd Street adjacent to the Swift & Company and Armour & Company packing houses. Plans call for a one-story building approximately 700 feet long and 230 feet wide. On one side will be a covered dock with a switch track for 13 cars, served by the Gulf, Colorado and Santa Fe railroad. On the other side will be a wide covered dock with doors for 54 trucks. The new plant should be ready for occupancy in June of 1955.

Freezing Capacity

The plant will have a freezing capacity of 250,000 pounds a day, of which 100,000 pounds will be handled in six blast freezers. Cold storage capacity will be about 20 million pounds in freezer and cooler space.

All service areas such as general offices, warehouse offices, rental offices, locker rooms and compressor room will be approximately in the center of the building. The south end of the building will contain approximately 50,000 square feet of unrefrigerated space, constructed for later cold storage expansion, but which will be available to tenants requiring proximity to cold storage or freezing facilities. The location of offices midway in the building should make the warehouse operation more efficient and will eliminate difficulty truck drivers ordinarily have in finding the proper spot for loading and unloading. There will be a concrete apron 80 feet wide extending from the edge of the truck dock allowing full freedom in the handling of large tractor-trailers and trucks.

The handling of merchandise will be by the use of fork lift trucks, electric jacks and pallets. The plant will be completely mechanized in this respect. Wide covered closed docks with a canopy over the rear end of trucks and other refinements will allow for the merchandise to be handled with the greatest protection.

Refrigeration Equipment

Refrigeration for maintaining temperatures in storage rooms and for freezing products, as well as for air conditioning and other space cooling, will be supplied from the centrally located compressor room. The most modern type of rotary boosters and high stage compressors will be in multiple units, with surplus capacity, to provide for maximum storage and freezing loads at all times. These compressors will refrigerate brine to be circulated through coils in the storage rooms and produce temperatures down to minus 40 F in the blast freezers. Overhead pipe coils have been chosen for refrigerating the storage rooms.

This is based on the company's long and varied experience in refrigerated warehouse operation and continued study of other methods. This is the same system used in the seven other plants operated by the company. The six blast freezer units to be included in the plant will provide for rapid freezing, which is advantageous for many products and which will shorten the time between processing and shipment of frozen products when rapid movement is required.

Located at Fort Worth, one of the major railroad centers in the United States, it is ideally situated for storage-in-transit stocks. The location is readily accessible from Fort Worth's Main Street and all major highways but is out of the congested downtown area.

Plans show air conditioned tenant offices and space for almost any type of processing. Arrangements can be made at once for leases and rentals either in refrigerated space or in the dry storage section or offices, to meet tenants' specifications.

Complete coverage of the storage areas and blast freezers by sixty-eight thermocouples make temperatures continuously available to operating personnel through a Honeywell-Brown electronic precision temperature indicator. This is supplemented by frequent readings of thermometers located throughout the warehouse.

Provision has been made for air purification, humidity control, and maintaining of other conditions best suited to the protection of products in storage.

There has been a critical shortage of refrigerated space in this area. Producers of meat and other foodstuffs have found it necessary to store their products in other cities. The practice has proven cumbersome and costly. During a period of national emergency it would present a very serious problem because of lost time and the strain on overtaxed transportation facilities. For this reason the project has been termed essential by the Office of Defense Mobilization and has been awarded a Certificate of Necessity by the government.

(Continued on page 51)

City Products Reports Expansion

A BROAD expansion program for City Products Corporation has been announced by William J. Sinek, president. The company last year had sales of more than 84 million dollars and net profit of more than $3,800,000.

In Cleveland the company has entered the canned soft drink field. It has been given a franchise with Mission Dry Corporation, Los Angeles, for the sale of that company's soft drinks. The drinks, of various flavors, will be canned in flat topped containers in a new building in Columbus, O.

Sinek said the company has acquired 27 ice properties of Florida Power and Light company which will strengthen the company's position in the commercial and domestic ice field.

The company has standardized its automatic ice vending machines in more than 100 cities. The Car Icing division in Chicago is expanding its facilities for servicing railroads.

City Products is building a large plant in Kansas City, Kas., to manufacture ice for Pacific Fruit Express Company and the Union Pacific railway.

In Weslaco, Tex., the company is building a plant with facilities for vacuum cooling, a new patented process for cooling leafy vegetables by evaporation. The plant is being built to serve growers and shippers in the Rio Grande valley. Both the ice and cooling plants are scheduled for completion this fall.

Sinek said that the company's Western division, operating in Arizona, reports success for its four recently completed vacuum cooling plants in the Salt river valley area. Leafy vegetable crops in the area are being vacuum packed and transported to market in ice refrigerator cars.

The company has more than 100 car icing stations throughout the country. Its 18 cold storage plants have nearly completed their freezer conversion program for the storing of frozen foods of all kinds.

The company's Natural Resources division, which operates in gas and oil in Oklahoma, Kansas, and Texas, recently completed a gas well capable of producing more than 3½ million cubic feet a day.

To strengthen the managerial personnel, two senior vice presidents have been appointed, Richard C. Muckerman in St. Louis and Fred F. Rhode in Chicago.

New Case for Iced Beer

A NEW type of beer case, called an Ice Pak is being offered by Pabst Brewing Company. The new cooler case is designed to keep canned beer cold at picnics, beach parties, fishing and hunting trips, boating, camping, and other outdoor activities. The Ice Pak is similar in construction to the regular 24-can carton, but features a water-proof inner liner which prevents melted ice from seeping through the outer casing and also adds to the insulating quality of the corrugated container.

By removing six cans of beer from the center of the 24-can case and packing approximately ten pounds of crushed ice or cubes in and around the remaining cans of beer, the contents of the Ice Pak are drinking-cool in 30 minutes. As the cold beer is consumed the six cans originally taken out are replaced for cooling. For convenience of carrying an opened case, handles are formed by folding back the top flange.

The Ice Pak, according to the N A I I Ice News, is ideal for icemen who are merchandising small packages of processed ice. It provides another receptacle for ice. It provides relief for overloaded picnic chests. Finally, and most important, it sells ice.

When it's

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REALLY DRY

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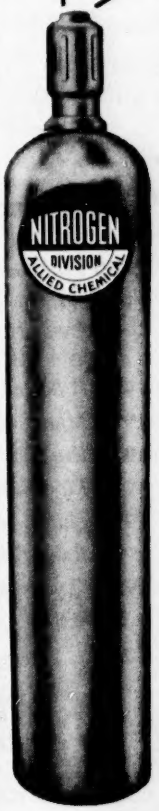
Anhydrous Ammonia



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1920 *Prohibition begins*

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1922 *Il Duce rules Italy*

1923 *Mah Jong*

1924 *King Tut's tomb*

1925 *Florida boom*

1926 *Queen Marie visits U.S.*

1927 *Babe Ruth hits 60 homers*

1928 *"I do not choose to run." (Coolidge)*

1929 *Stock Market Crash*

1930 *Freon-12 developed by Dr. Thomas Midgeley and Dr. Albert E. Henne*

1931 *Sidewalk apple vendors*

1932 *Lindbergh kidnapping*

1933 *Chicago's World's Fair . . . Hitler rules Germany*

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The development of modern Refrigeration, Air Conditioning and Low Temperature Freezing through the years since 1914 has been one of American Industry's truly great achievements. To men like Carrier, Copeland, Birdseye, Midgeley, Henne, and a host of other scientists and inventors all mankind is forever indebted. It is a privilege to have had a part in the growth of the giant industries which the genius of these scientists made possible; and to have been associated with the engineers, the executives and the salesmen who labored to bring the fruits of genius into the lives of men.

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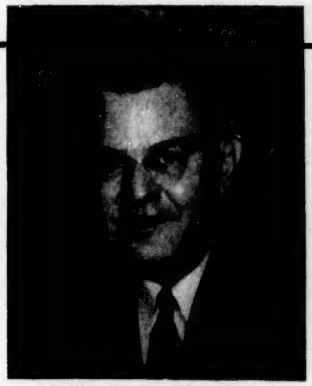
1938 *"Wrong Way" Corrigan*
1939 *World War II begins*
1940 *FDR vs Willkie*
1941 *Pearl Harbor*
1942 *Guadalcanal*
1943 *Ration Books*
1944 *Normandy Landing*
1945 *V-E and V-J Days*
1946 *First radar contact with moon*
1947 *Princess Elizabeth marries the Duke*
1948 *Truman and Citation strong in the stretch*
1949 *Russia explodes atomic bomb*
1950 *Reds invade Korea*
1951 *Truce talks*
1952 *"I like Ike"*
1953 *End of Korean War*
1954 Henry Valve's 40th Anniversary



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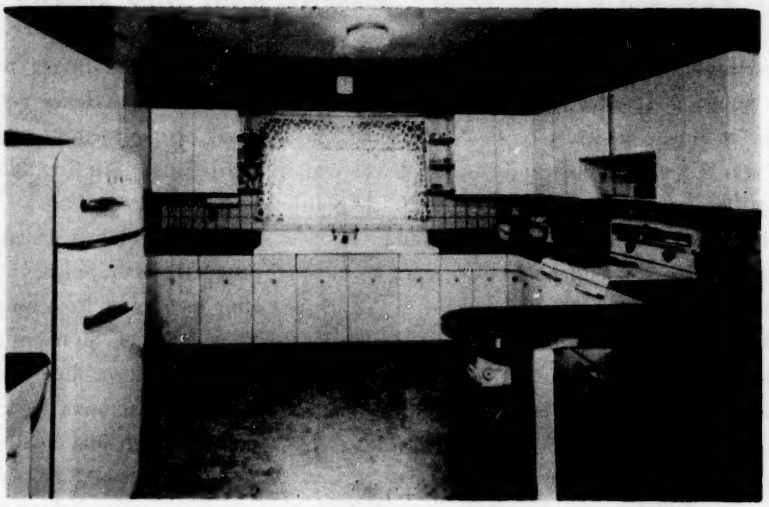
Ohio Ice Company Builds Bigger Business With Kitchen Appliance Division

IT doesn't take a sparkling, glistening appliance parlor to sell kitchens. The bulk of the "advertising" can be word-of-mouth; the bulk of the actual selling of the kitchen is done in the home. At least that is the way the Middletown Ice & Coal Company, Middletown, Ohio, has built up a kitchen volume of over $50,000 a year, with only one man and two helpers, doing everything from selling to installing.

The appliance division of the ice and coal company, headed by James Merrick who has been with ice companies since 1937, entered the kitchen field on a sort of logical step-by-step expansion basis. "We started an appliance department with freezers in 1946," Mr. Merrick states. "Then we added cabinet sinks. Here we learned that the sink is but one unit in a kitchen. Hence we wound up in the kitchen business."

Even here, the logical, but unintentional progress was from displaying kitchens to selling kitchens, to installing kitchens. Today, Mr. Merrick says, "We tackle everything."



Modern kitchen equipment installed by Middletown Ice & Coal Company, including cabinets and sink, range, refrigerator, light fixtures, and floor and wall covering. Installation made in residence of Elmer Reed, Middletown.

Complete Service

What he means is that if a sale of a complete kitchen is conditional upon a modernized bathroom, new plumbing, flooring and back porch, it in no way restricts the operation. "We now undertake to do all that, if necessary," he points out. "We submit an estimate on the entire job, listing each individual item of work, each part. Getting the 'go-ahead', we sub-contract to a plumber, carpenters, and a floor coverings store. In many cases, sub-contractors portions amount to more than our sale."

Mr. Merrick himself does all the selling. He draws up the plans and he participates in shirt sleeves in the final installation. But, the firm goes a step further. If a job requires the rebuilding of a standard cabinet, "we do that, too," Mr. Merrick states.

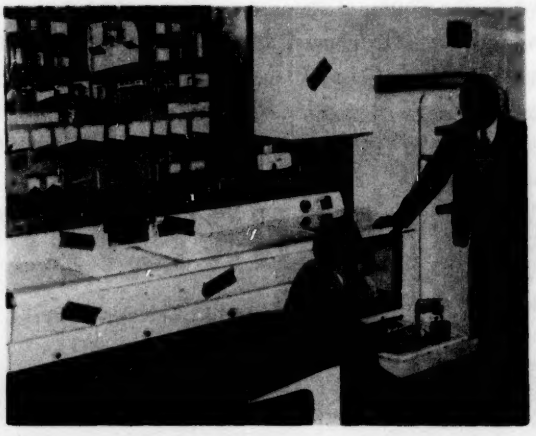
Basically, the operation depends upon word-of-mouth. But sales on hand at present are sufficient to keep all three men busy for several weeks. "We have a small advertising budget," Mr. Merrick says. "We advertise about once a week — that is, the entire appliance division does — with about 75 percent of it going to kitchens. Kitchens constitute about 75 percent of the division's total volume."

The company's appliance operation depends entirely on American Kitchens and Servanet Birch kitchens. On occasion, the two will be mixed, but this is seldom, and only where the customer wants it. Sometimes locally built merchandise will be used with the others.

The selling is done "a la insurance agent" style in the evening when both husband and wife are home, the one to decide what is wanted, the other to okay the necessary financial outlay.

Training the Crew

Training of the installation crew, consisting of Mr. Merrick and the other two men, experience being the best teacher, augmented by factory trips. Manufacturers, he finds, are



Left: Front view of appliance store Right: American kitchen display in appliance store of Middletown Ice & Coal Company. J. F. Merrick standing at dishwasher; Carl and Carl Bimel, representing Bimel Company, Cincinnati distributor of American Kitchens

most fair, with their cooperative money. A recent Home Show at Middletown at which the ice and coal company had a kitchen booth, found a large share of the cost of the booth paid by the manufacturers.

Schools Equipped

As testimonial to the success of this operation, the Middletown High School and the two Junior High Schools' home economics departments have been equipped with the most up-to-date American Kitchens equipment. A minimum inventory of $25,000 (cost) in cabinets is carried. Conceding that this raises the questions of expenses, he maintains it pays off because they can immediately get the right cabinet for the right space on any job.

Otherwise, the operation gets into the "cabinet" business, cutting and insulating bases on standard cabinets to insert register grilles, installing an exhaust fan in wall cabinet or actually building a new front and hanging American doors on it, if necessary.

Mr. Merrick uses the American Kitchens planning kit. Where it seems required, he plans the kitchen for the customer in black and white; again he will on occasion actually draw it in color, if such detailed work will make a sale that otherwise might be lost. Pictures are taken before and after many jobs, these pictures being used as sales material, and they are the best sales material available.

Meeting Space Requirements

Some of the main problems encountered involve space requirements which simply cannot be met by standard kitchen cabinet sizing. "When you get into the work of rebuilding cabinets, it slows you down," Mr. Merrick said.

This operation is based to a great extent upon speed, because there are so many jobs to do, and so few people to do the work. Much of his success has been with contractors, and he has had to install almost identical kitchens in some 43 almost identical houses in a short period of time. Remodeling jobs comprise the vast majority of total volume.

The store itself is small, only about 1200 square feet. Here, Mr. Merrick keeps his files (the kitchens themselves being warehoused in the company's warehouse) and shows two kitchen displays, one American, one in Birch. The store also is in an out-of-the-way part of town.

Mellorine for Butterfat In Frozen Desserts

PRODUCTION of Mellorine and Mellorine-type of frozen desserts made with vegetable fats or oils other than butterfat in combination with certain milk solids in 1953 was more than double the output of 1952. During 1953, a production of 22,494,000 gallons was reported in nine states. In 1952, only four states reported Mellorine production. In some states, such as Alabama and Arkansas, permissive authority by state legislative action to manufacture Mellorine or Mellorine-type products was not granted until after the year was under way. Texas, leading Mellorine producing state, had a 1952 output of 10,870,000 gallons, an increase of 71 percent over the preceding year.

Texas was the first state in which this product was made. "Mellorine" was copyrighted by the Texas State Department of Health, and its use is permitted in any other state which wishes to use the name for a product similar to ice cream, but made with vegetable fats or oils instead of butterfat. Illinois, second ranking state, gained 116 percent from 1952.

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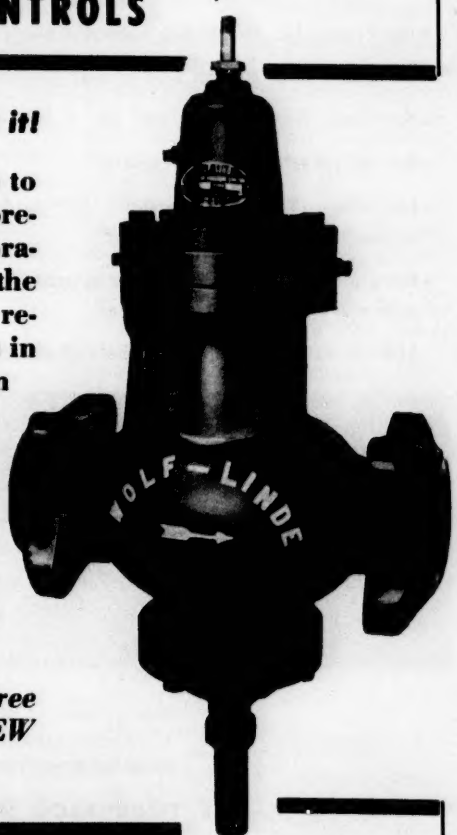

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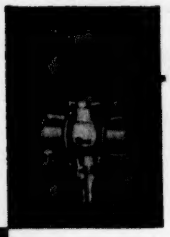

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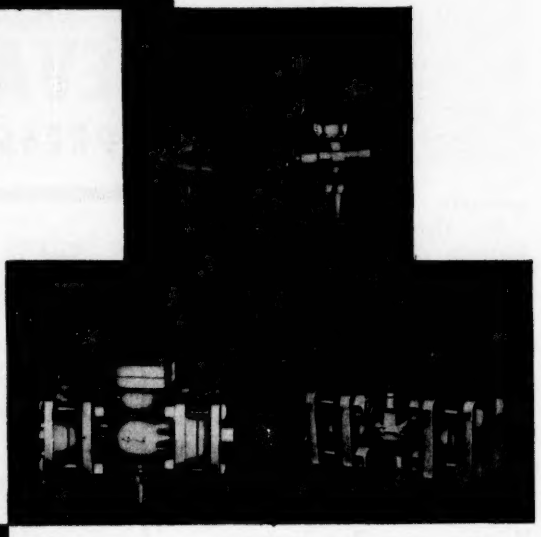

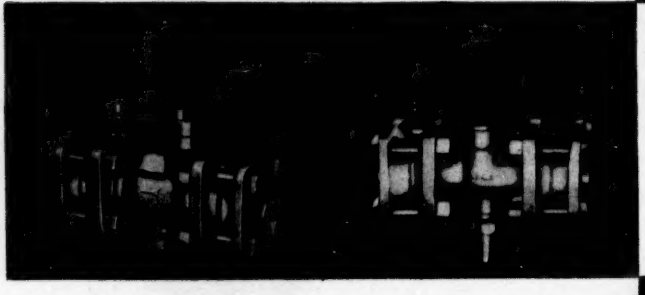

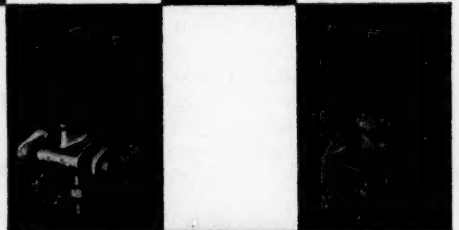

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Practical Refrigerating Engineer

NATIONAL ASSOCIATION PRACTICAL REFRIGERATING ENGINEERS

Modern Fast Freezing of Packaged Products

Functions of the package type freezer produced by a Pacific Northwest manufacturer, are explained.

FRANK W. KNOWLES
Manager, Belt Ice Corp.
Seattle, Wash.

FOR MANY years the writer, like other manufacturers of refrigerating equipment, has been attempting to replace manpower used in quick freezing processes, with horsepower. When it is possible to eliminate manpower, and a substantial amount of horsepower, everyone benefits. Cutting production costs is actually an aid to all.

The automatic package freezer described here, eliminates a great deal of manpower and horsepower. The machine actually makes it possible for the owner of a quick freezing plant to approach the production line methods achieved by the canner, where food to be canned is routed through the cannery from the receiving platform to the shipping room without the use of any hand labor.

Basically the new automatic freezer is a stack of refrigerated plates, arranged in a cage and controlled by an electric eye and relays. The entire arrangement is housed in an insulated non-refrigerated room and is served by a conveyor bringing packages from the processing room. A second conveyor carries the frozen packages away from the freezers to the casing area. See Fig. 1.

Operation Described

The automatic operation is controlled entirely by the loader. To start the freezing cycle, the operator pushes a momentary contact button which actuates the freezer, bringing the top plate into position, open and ready to receive a load of packages. When a row of packages on the conveyor is in position for loading, the operator pushes the loading button, actuating the ram-type loader which in turn pushes the row of packages into the space between the plates. This action is continued, the operator pushing each row of packages into the freezer thru the medium of the loader, until the plate is loaded.

When the first plate is full, the machine automatically shifts the next plate into loading position and the loading cycle is started for the second plate. This operation is continued until the last plate is loaded with packages. Then the machine automatically returns all of the plates to the bottom position and is ready to start a new cycle. On the second loading, as fresh packages are pushed into position on the plates, frozen packages are pushed out of the freezer and onto the conveyor for delivery to the casing room.

The arrangement has been kept as simple as possible. On opening, the plate intended to receive packages comes to rest on heavy steel dogs positively spacing the plate. At the end of the loading period these dogs are cammed back and locked out of the path of the plates as they descend to start another cycle. As the group of plates reach the bottom of their travel the dogs are released and are pulled into supporting position by the stack (See Figs. 2 & 3).

Simple Refrigerant Circuits

The slant of the plates is an aid in heat transfer, as the movement of refrigerant upward thru the coils has a tendency to sweep the heat exchange surface clear of bubbles, thereby increasing the freezing rate (Fig. 3).

The ammonia circuit may be forced feed or gravity circulation. To aid the gravity feed, all plates are slanted upward from the refrigerant inlet to the suction side. Each plate has an individual inlet from a header, and a suction connection to the side of another header or accumulator. (Fig. 4). Each plate has a multiple coil of ¾-inch square tubing. As the de-

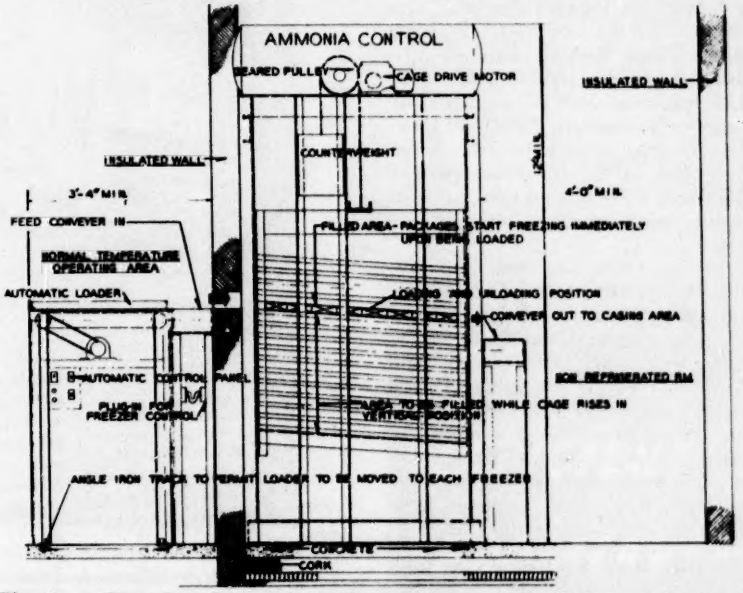

Fig. 1 — Knowles Automatic Package Freezer. Manufacturers sketch of typical operating sequence.

Paper prepared in April 1954, for presentation to members of Seattle Chapter, NAPRE, during fall field trip to a local food freezing establishment. Mr. Knowles is an associate member, NAPRE. The unit described bears his name.

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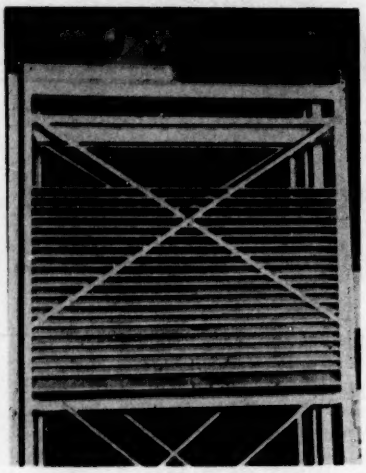
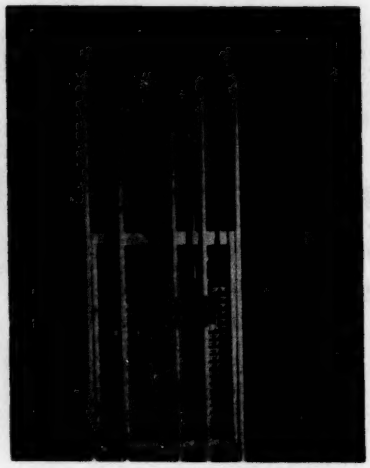




Figs. 2 & 3 — Factory photos. At left, rear view of package freezer with cage in top position. Right, end view of unit; cage in lower position. Note drive and counter weights.

sign of the coils permits exceptionally close centers, the vacuum plate surfaces have a very large area of contact with the coils.

The loading rate permits the freezing process to start as the packages are loaded. Plates can be loaded at the rate of 200 packages per minute. As the largest plate in use at present will accept 152 — 4 x 5¼-inch packages, the load is under refrigeration and pressure within less than a minute from approach to the loader.

Hot Gas Defrosting

Defrosting has not been a problem. It is recommended that the machine be defrosted at the end of each run, or monthly. Hot gas connections are provided for this purpose.

Packages do not stick or freeze to the plates. Leakers cause no difficulty unless the leak is substantial. The machines may be arranged for completely automatic operation. However, this has not been done due to imperfection of the conveyor systems; the tendency of packages to turn across the conveyors at turns or corners.

In operation one man can operate an installation capable of loading up to 9,000 packages per hour; or, in the case of Canco or Sefton containers, about 12,000 cans per hour. The variety of package sizes used by precessors makes it necessary for a machine of this sort to be capable of considerable adjustment. It is possible for this package freezing machine to accept packages any thickness within the design range.

Freezing Rate Factors

Plates open and close on spacers that govern the pressure applied to the packages. The spacers are small steel blocks that are detached or put in place by one turn of a cap screw. The maximum thickness of the packages to be loaded is governed by the height in the plant where installed. Stock machines are built to load packages from 1⅛ to 2-inch thick. Minor changes will permit the loading of packages to 3½-in thick.

Without lost loading time, the freezing rate of packages in the automatic plate freezer is dependent on: temperature of product input; temperature of refrigerant; thickness of package; and, percentage of fill, i.e., the air space in the package over the product when in the freezer. Product temperature is controlled by the water temperature available for the final wash or fluming operation. Many western plants are precooling at that point, dropping the temperature of produce to as low as 40F on entering the package. Refrigerant temperature recommended by the manufacturer is minus 30 F.

Housewife Sets Package Size

Package thickness is governed by Mrs. Housewife. This has been somewhat complicated of late by the desire on the part of the distributor to give the lady small portions, and still maintain the package size. That, in turn, has led to 1¾ x 4 x 5¼-inch package, originally intended for one pound of produce, being used as a container for 10½ ounces. The air space over the product prevents plate contact on top of the package and materially slows freezing.

Floor space always an important

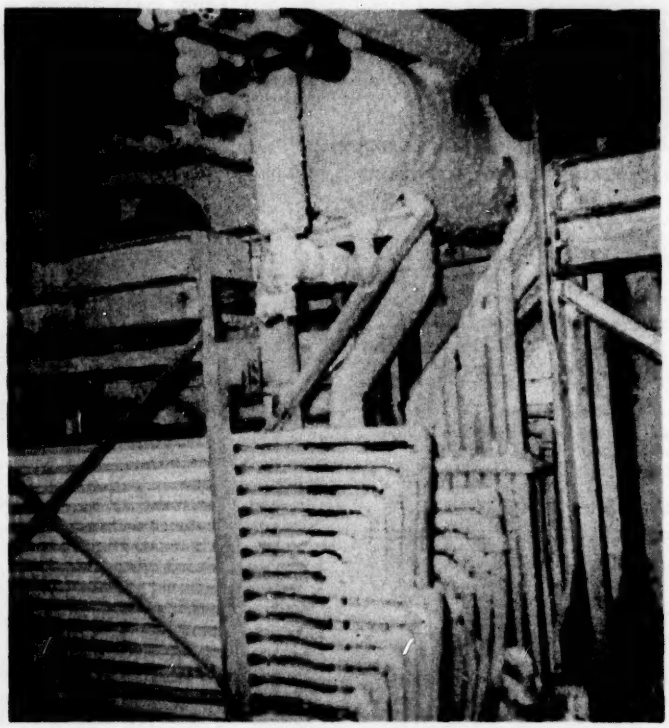
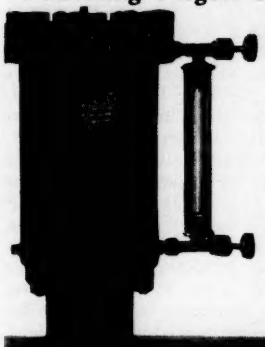


Fig. 4 — Package freezer in operation. Note packages between plates. Accumulator is located near ceiling. Horizontal lines in foreground and connecting flexible tubing supply liquid to plates. Vertical cluster of lines behind, return liquid to accumulator.

ARMSTRONG PURGER SAVES $500 FOR ICE CREAM PLANT FIRST YEAR OF OPERATION

MR. H. L. COOKE, Plant Superintendent of the Howard Johnson Ice Cream Manufacturing Plant in Baltimore, Maryland, reported his plant saved $500.00 in ammonia the first year after installing an Armstrong Forged Steel Purger.



Armstrong Purgers automatically remove all non-condensable gases from refrigeration systems without excessive waste of refrigerant. As a result refrigerant costs are lower, head pressures are reduced, cooling water consumption is lowered, power costs are cut and valuable time is saved. For full details write for Bulletin No. 1921.

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BULLETIN No. 1921
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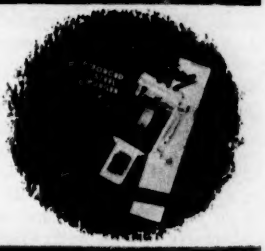

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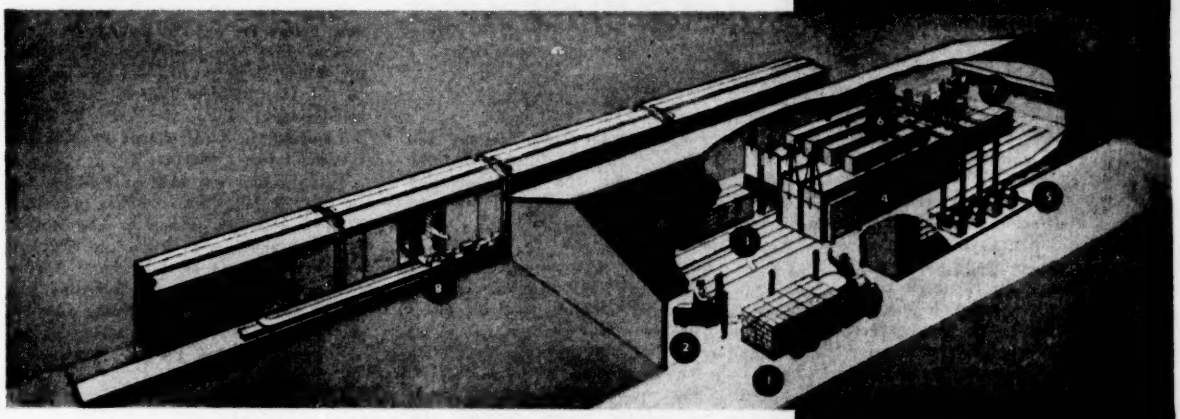

TYPICAL GAYVAC PLANT LAYOUT

1 Field-packed produce cartons arrive at plant on pallets.

2 Pallets are transferred by forklift to retort dollies.

3 Loaded dollies are moved into the vacuum chamber.

4 Control panel records each operating cycle—shuts off automatically when produce reaches desired temperature.

5 Vacuum pumps reduce pressure in the system to vaporize inherent water in produce, thus reducing produce temperature.

6 Cooled by a refrigerant, the condenser changes "the water vapor given off by the produce" back to water.

7 When produce is cooled, the dolly is moved out of the retort where the cartons are unloaded to a conveyor belt.

8 Produce is loaded into standard refrigerator car or truck from conveyor belt, and is ready for shipment to market, without top icing.

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factor, is held to a minimum. Each machine capable of accepting 3,040 4 x 5½-inch packages, occupies a floor space 8 x 11 ft. including conveyors. The new model loader does not actually occupy floor space, but extends into the passage way 24-inches beyond the feed conveyor, at loading height. Substantial economies in operating cost, freezing time and space are features of this new method.

News Notes and Chapter Activities

Seattle

CHET BERTUS

WITH uncanny accuracy, the Seattle chapters of NAPRE and RSES seem able to pick dates for social events that will be either stormy or threatening. Sunday, July 11, was no exception. It was cloudy all day with just brief glimpse of the sun now and then. Despite the gloomy weather there was a good turnout of the members and their families, some 170 participating in the joint picnic.

Two families drove over 300 miles to join in the fun. The Tacoma chapter, RSES brought along a couple barrels of beer in case the weather should turn warm, which never did take place but the beer disappeared just the same. Free coffee, pop and ice cream was furnished by the chapters. Tacoma chapter RSES, took advantage of the occasion to get in a plug for the Western International Association RSES chapter's Annual Educational Conference to be held in Tacoma next March.

Three members and their families of the newly formed Olympia chapter, NAPRE, accepted the invitation to Five Mile Lake where the picnic was held, and got acquainted with the other Washington chapter's officers and members. There were numerous competing events for the youngsters from 5 to 50, with prizes for everyone. Gift certificates ranging from $5.00 to $10.00 were contributed from the wholesalers of the area as door prizes. Two boats were rented for the day by the chapters so the members and their families could enjoy a ride around the lake. A good time was had by all and everyone was looking forward for next year's picnic.

NAPRE members at joint Washington RSES-NAPRE picnic in July: Bob Harrison, National Educational Committeeman, Clarence Geil, Seattle, Jim Bennett, Tacoma, Falconer Anderson, Olympia and Gil Hickock, Seattle president.

New Orleans

DAN BEHRE

IT HAS been a long time since New Orleans has seen such big preparations for a convention as is now going on for the November convention of the NAPRE. There is much chit chat on Canal Street and in the Vieux Carre about the coming of the engineers and their families to our gay city and the Roosevelt Hotel.

In addition to convention plans, recent chapter meetings have been exceedingly interesting and especially entertaining. On May 26, H. W. Newsome discussed centrifugal pumps used in air conditioning. His talk was instructive and well presented. The meeting was held at the Ingersoll-Rand branch and refreshments were served by them.

The next meeting, June 9, was held at the Roosevelt hotel. L. N. Frick, Dallas district shop production manager, construction absorption specialist of Carrier Corporation, spoke, demonstrated and instructed the group on absorption machines. On June 23, at the Crescent City Ice Co. Auditorium, many new members were present at a buffet supper. The turn out filled the auditorium to capacity as every member brought a guest. Over 400 people listened to H. L. "Dill" Pickle of the Benjamin Foster Company, Philadelphia, talk on surface coating for cold piping and cold storage finishing. "Dill" discussed three principal types of cold pipe insulation and demonstrated the latest adhesive and vapor sealing materials developed to deal with these problems.

On July 14, at the Roosevelt hotel, Forrest W. Marshall, Westinghouse Electric Corporation, Air Conditioning Division, addressed the meeting on field assembled equipment. Marshall spoke on difficulties that he has experienced with various air-conditioning equipment. He stressed cleanliness not only of motors, dampers, and general equipment, but also of air intake and exhaust ducts.

Memphis

CHAS. CONLEY

THE Chapter held a round the table meeting on July 7 in spite of the very hot weather. Memphis has recessed its educational meeting for the summer months but there is still good attendance. The group talked, in general, about what is going on in their work in the various types of plants; about their problems. It seemed that the engineers in the air-conditioning plants are the ones that have outstanding problems today, including those that service air-conditioning plants.

Chicago Chapter

WILLIAM O'REILLY

CHICAGO Chapter is holding "preliminary" classes during July and August for new members. It was agreed that the classes are very educational, and have helped or will help the members a great deal in their work. National Board Chairman, Bert McKenna, our Chapter Past-President, assisting in the arrangements of the "preliminary" class, was of the opinion that continuing of classes through July and August means eventually the new members and members missing the first part of the Buy King lessons will be advanced in the course to the section covered by the regular meetings.

As new members continue to join NAPRE, this "preliminary" class becomes perpetual; each group eventually must overtake the regular class leaving the instructor free of starting a new group too frequently. McKenna states, "The Chicago Chapter hopes to give each new member the opportunity to complete the course under the supervision of a trained and experienced instructor".

At our July meeting, we were informed that our newly elected President, Lloyd Beard, has been transferred to Canada by the Kraft Foods Company for an indefinite period. Although we are sorry to lose the services of Lloyd, we understand that this is a great opportunity; we wish him much success and will be looking forward to his return on the completion of this assignment.

It was necessary to elect a new president before the fall classes. Art O. Clementson, first vice-president, will assume the duties of president. Nick M. Downes, second vice-president, moves up as first vice-president. John M. Forti, Westerlin & Campbell Co., was elected unanimously as second vice-president.

This meeting was held at Buildice Co. on July 27. Here the class was instructed by Geo. Anderson on how to read Mollier diagrams, and how to locate the complete refrigeration cycle on this chart. A very good question and answer discussion was led by Gene Rytlewski. Chicago Chapter expresses its thanks to Buildice Co. for use of their hall and for the refreshments.

Pittsburgh

OTTO KNOCH

ONE of Pittsburgh's leading engineers, William P. Wiemann, died in July. Mr. Wiemann, 91, held some 45 patents on water purifiers and other devices. His inveption of a liquid refracting lens won him honorary membership in the Astronomical Society of France.

Mr. Wiemann first worked as a cigar maker in Pittsburgh and Chicago. But an electric light bulb in a Chicago theater was the turning point in his career. It so fascinated him that he returned to Pittsburgh and went to work for the Brown Electric Co. Shortly afterwards, he

joined Westinghouse Electric as a traveling engineer, installing the first electric power plants for the firm. In later years, he served as chief engineer at the Wabash building, at the Union Ice Company's three plants, and at the North Pole Ice Co. Mr. Wiemann was a past president of the National Association of Stationary Engineers and local chapter, NAPRE.

Members-at-Large

LEROY ETZEL

HOW many of the members realize that we have a goodly number who are citizens of our good neighbor, Canada? Last Year at Purdue, many of us had the opportunity to get acquainted with Robt. J. Heartwell, chief engineer and treasurer, Sarnia Ice Co., Ltd., Sarnic, Ontario. Bob volunteered for some work, and our national president promptly placed him on the Membership Committee.

Other members in Ontario are G. T. Crawshaw, refrigerating engineer, City Council, Hamilton, and Geo. O. Paterson, owner-manager, Arctic Ice Co., Ltd., Brantford. We have another refrigerating engineer in Geo. M. Cook, Lunenberg, Nova Scotia.

In New Brunswick, John J. Dolan is manager-secretary-treasurer of Crystal Ice Co., Ltd., at St. John. John A. Kennedy manages his own firm in the same city, and F. P. Driscoll is president, Moncton Ice Co., Ltd. in Moncton.

Space limitations prohibit mention of all Canadian members, but we are able to list a few more heard from recently: A. Houle, office manager, I. A. Thibault, Ltd., Montreal, Quebec; Bill Gomany, Broder Canning Co., Lethbridge, Alberta; and R. S. Pearce, director manager, Manitoba Cold Storage Co., Ltd., Winnepeg.

North of our U. S. chapters in Washington, in British Columbia, are located E. A. Cruise, asst. Manager, Vancouver Ice & Cold Storage, Ltd., and Ernest W. Saunders, chief engineer, Royal Ice & Cold Storage, Ltd., both of Vancouver. Alfred Wm. Burnip is chief engineer at Northern Fisherman's Cold Storage, Ltd., Prince Rupert.

Colton

HARRY BONTON

AT THE meeting of June 9, the Chapter accepted an invitation by plant manager Frank Scherer, National Ice & Cold Storage Co., Riverside, Calif., to make an inspection tour to see some new equipment and modernization of the plant. The group enjoyed motion pictures on safety by the Baker Lift Truck Co., the right and wrong way to drive, stacking material with a lift truck, the proper way to load material, and to carry it safely. Then the group enjoyed a very generous lunch and drinks.

The meeting of July 14, was at the Santa Fe ice plant lunchroom, San Bernardino, Calif. First vice-president Carl Hooker presided in the absence of T. C. Bangs. C. H. Purkiss introduced the speaker, R. L. Scholey, U. S. Gypsum Company. Mr. Scholey presented a moving picture on the manufacture and processing of wood pulp into building material.

NAPRE

Question Box

The National Educational Committee, NAPRE, answers monthly in this column, operating problems forwarded by members. The Committee appreciates answers from the field. Both questions and answers should be addressed to Prof. H. G. Venemann, 269 Littleton St., West Lafayette, Ind.

Refrigerants Wear Out?

QUESTION NO. 1011: In the King course, section 8, chapter 15, on page 236 and 237 it is mentioned that the refrigerant in the system does not wear out. Does Mr. King mean "Freon" or ammonia? With ammonia, we believe that excessive discharge temperatures will have a tendency to break down the gas. Also, when oil mixes with ammonia it is believed that it will have an easier tendency to break down; that is, at high tem-

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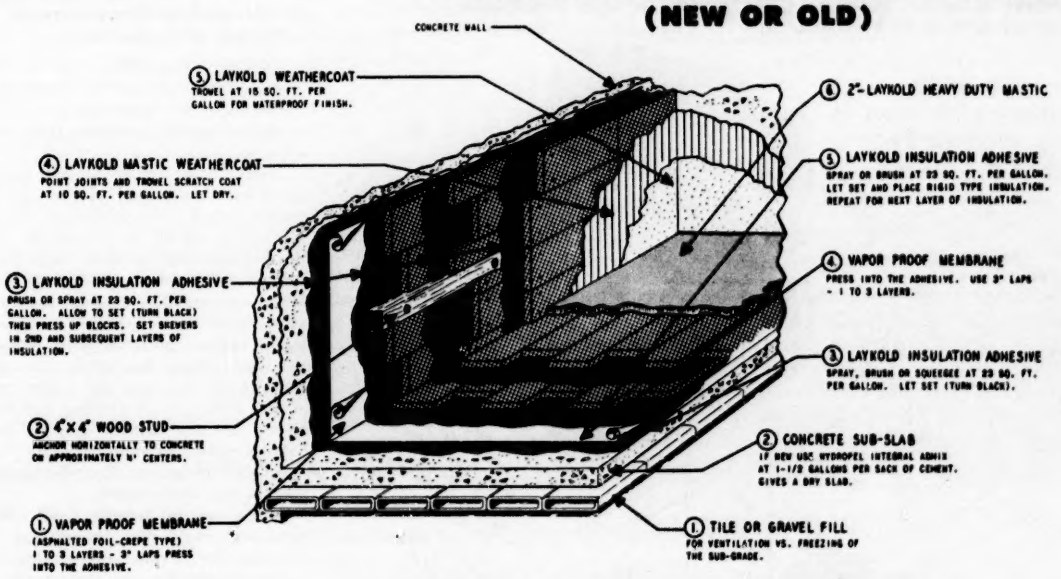
DATA SHEET No. 5

How to ANCHOR Insulation ON A CONCRETE WALL and FLOOR (NEW OR OLD)


CONCRETE WALL
5 LAYKOLD WEATHERCOAT
TROWEL AT 15 SQ. FT. PER GALLON FOR WATERPROOF FINISH.
4 LAYKOLD MASTIC WEATHERCOAT
POINT JOINTS AND TROWEL SCRATCH COAT AT 10 SQ. FT. PER GALLON. LET DRY.
3 LAYKOLD INSULATION ADHESIVE
BRUSH OR SPRAY AT 23 SQ. FT. PER GALLON. ALLOW TO SET (TURN BLACK) THEN PRESS UP BLOCKS. SET BREVERS IN 2ND AND SUBSEQUENT LAYERS OF INSULATION.
2 4"x4" WOOD STUD
ANCHOR HORIZONTALLY TO CONCRETE ON APPROXIMATELY 16" CENTERS.
1 VAPOR PROOF MEMBRANE
(ASPHALTED FOIL-CREPE TYPE) 1 TO 3 LAYERS - 3" LAPS PRESS INTO THE ADHESIVE.
6 2"- LAYKOLD HEAVY DUTY MASTIC
5 LAYKOLD INSULATION ADHESIVE
SPRAY OR BRUSH AT 23 SQ. FT. PER GALLON. LET SET AND PLACE RIGID TYPE INSULATION. REPEAT FOR NEXT LAYER OF INSULATION.
4 VAPOR PROOF MEMBRANE
PRESS INTO THE ADHESIVE. USE 3" LAPS - 1 TO 3 LAYERS.
3 LAYKOLD INSULATION ADHESIVE
SPRAY, BRUSH OR SQUEEGEE AT 23 SQ. FT. PER GALLON. LET SET (TURN BLACK).
2 CONCRETE SUB-SLAB
IF DEW USE HYDROPEL INTEGRAL ADMIX AT 1-1/2 GALLONS PER SACK OF CEMENT. GIVES A DRY SLAB.
1 TILE OR GRAVEL FILL
FOR VENTILATION VS. FREEZING OF THE SUB-GRADE.

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peratures. Could you instruct us further?—H.C.D., Calif.

ANSWER: H.C.D. is right in that there is a *tendency* for ammonia to break down. At the compressor discharge, hot ammonia in contact with hot oil and hot metals will show a *tendency* to break down. But this breakdown is a very minute part of the ammonia circulated, and probably adds no more impurities to the ammonia than contamination from other sources. And it is usually more noticeable as excessive head pressure long before it would show as low refrigerant. This was covered, perhaps imperfectly, in the course in the top two paragraphs of page 52.

The statement referred to on page 236 and 237 is to stress the fact that with ammonia or any other refrigerant, if one must keep adding refrigerant to a system to keep it operating properly, there is definitely a leak which should be found.—Guy R. King.

Improvised Tunnel System Inadequate For Fast Freeze

QUESTION NO. 1012: The sketch below represents a quick freezing tunnel located at one end inside a large freezer storage room.

Air from the freezer storage room blower type evaporative unit can be diverted into the tunnel for quick freezing. Air temperatures can be reduced to as low as minus 30 F and seldom rises above 20 F even with loads of 30,000 pounds in the so-called tunnel. Loads to date have consisted of strawberries, okra, spinach and other vegetables.

When the air from the freezer room is diverted to the tunnel, the blowers deliver only 12,000 cu. ft. of their rated 19,000 cu. ft. since the damper arrangement is such. Product in the tunnels comes in at 75 F in 30-lb cans and occasionally 3-, 5- and 10-lb cardboard boxes. Occasionally some 10- and 20-oz. wax paper wrapped packages are frozen.

Our problem is we don't freeze the stuff fast enough. As near as I can figure it, we should have 600 to 800 fpm through the product to be quick frozen. With an 8 x 14 x 22 foot tunnel, I figure that we are not getting much more than 100 fpm. How can I prove this on paper to my employer? And how can I show him in figures what size fan we should use to get 600 to 800 feet? Will I have to change my coil surface? (Nameplate data of my unit is attached).—A.J.C., Chicago.

ANSWER: This question involves freezing time, air velocity and coil surface. We learn upon further inquiry from A.J.C. that the real question pertains to the air velocity through the tunnel. The freezing time will naturally vary with the size of the packages, room temperature, kind of wrapping, nature of product, and the air velocity past the product.

The average air velocity may be computed by the old familiar equation where

V = Q/A

V = velocity in ft. per min.,

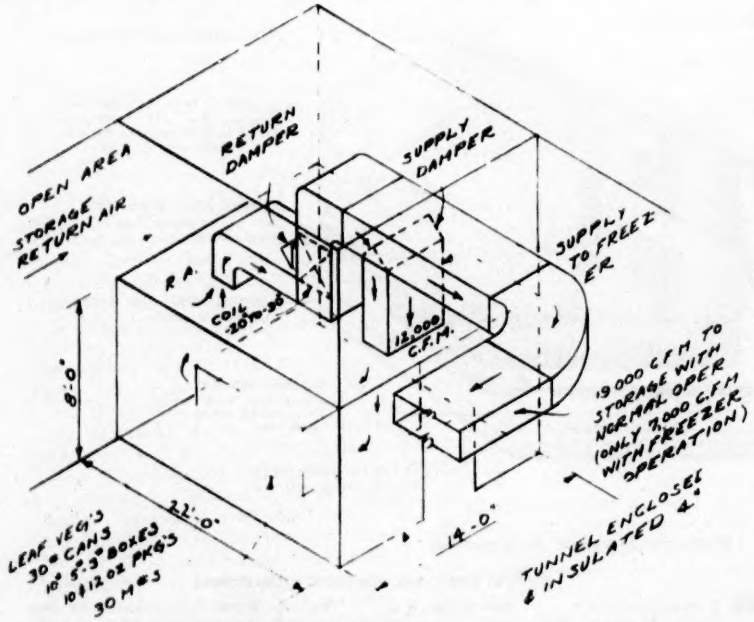
Q = volume in cu. ft. per min., and

A = cross-sectional area in sq. ft.

In this case the cross-sectional area of the tunnel, 14'-0 wide x 8'-0 high, is 112 sq. ft., and the volume of air is 12,000 cfm. Therefore, the air velocity is about 107 fpm when the room is empty. If the cross-sectional area of the room is half blocked with packages, the velocity of the air will be increased to about 214 fpm.

To obtain an average velocity of 600 fpm the delivery would have to be 67,200 cfm when the room is empty, 33,600 cfm when half blocked with packages, and 16,800 cfm when three-fourths blocked.

We understand that the air velocity in the tunnel has been increased by the use of axial-flow fans. These are objectional because they take up too much room.—HGV



Isometric of modified tunnel built into corner areas of large freezer storages.

Air Purge Compressor Before Cutting Into System

QUESTION NO. 1013: Is it still dangerous to cut in a unit in the line without first pumping out the air? Where I work the engineer has cut in a 12 ton, a 15 ton and a 25 ton refrigeration compressor in the line without pumping the air out of the units with no bad effects, outside of raising the condenser pressure, which was removed by a Hill separator. Always heard a disastrous explosion will often occur. Is it because the right percentage of air is not introduced?—D.W., Mobile.

ANSWER: I do not think it is dangerous to cut in a unit in the line without first pumping out the air. Personally I think it is better practice to discharge the air through the purge valve or plug below the main discharge stop valve. It is a very simple operation and gets rid of the air long before it will be removed by the Hill non-condensable gas separator. Ammonia does not explode in air, in fact it will not stay lit in air. There is a very excellent article in the 1954 NAPRE Operating Data Book entitled "How Dangerous is Ammonia?" which it would be well to read.—HGV

Bubbles In Receiver

QUESTION NO. 1014: What causes liquid NH_3 to bubble up in the gauge glass of the receiver? This seems to take place regardless of where the receiver is located; inside or outside a building, and irrespective of surrounding temperature at vessel. —Conley, Memphis Sec'y.

ANSWER: Evaporation is a process whereby molecules of a liquid are converted into the vapor phase and escape at the surface of the liquid. It is a surface phenomenon.

Boiling is a similar process that takes place within the body of the liquid. The bubbles which are produced in the process of boiling would be unable to form if the pressure exerted upon them from the outside were greater than their own internal pressure. The external pressure consists of the vapor pressure on top of the liquid surface, plus the static pressure of the liquid above the bubble. The internal pressure is the saturated vapor pressure of the liquid at its existing temperature. Hence a liquid cannot boil or produce bubbles unless its vapor pressure is equal to or slightly greater than the vapor pressure on top of the liquid.

Boiling can be brought about either by increasing the liquid temperature or by reducing the external vapor pressure.

Bubbles may be seen very readily when starting a plant immediately after turning water on the condenser, provided that the water is colder than the ammonia in the receiver. Prior to turning on the water, the liquid in the receiver and the vapor

(Continued on page 42)

Freezing Stops Crumbling In Mine Shaft

A GIANT refrigerator may prove the key to the first successful development of Saskatchewan's huge potash reserves, near Unity. The refrigerator will have pipes running hundreds of feet into the ground around a 12½ foot shaft being bored by the Western Potash Company of Calgary in search of the fertilizing mineral. The shaft now is at the 500-foot level. It has almost 3,000 feet to go to reach the potash beds.

The refrigeration technique was adopted after months of trouble in boring through crumbling formations and water zones. It is the first time it has been used successfully in Canadian mining. The firm struck quicksand near the surface and an artesian well zone ot 235 feet. The foundation of the shaft crumbled and water oozed in continuously.

At the 160-foot level, a drilling chamber was excavated and holes drilled around the shaft area. A refrigeration plant was set up in the chamber and brine pumped down plastic pipes until the entire shaft was frozen solid. Freezing stopped water from pouring in and solidified crumbling material. Crews quickly poured in an interior lining of reinforced concrete. The company hopes the 1,000-foot level will be reached in three months.

The shaft is the first attempt to mine the material in Saskatchewan, estimated to have the world's largest deposits. Western holds development rights to 120,000 acres estimated to contain about 2,500,000,000 tons of potash ore. The Potash Company of America, largest producer in the United States, signed an agreement with the provincial government last year for development rights on 100,000 acres near Saskatoon. The company agreed to start a production shaft and other facilities by May 1, 1956, at a cost of $3,000,000.

Adequate Storage Space For Butter

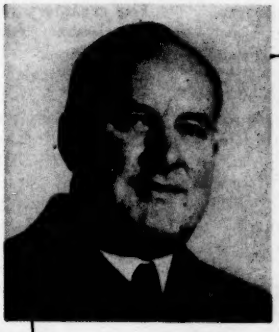
MANY tons of surplus butter being purchased by the government under the price support program have been shipped into the Port of New York area to be stored. But there is still adequate *cold storage space* to handle regular customer requirements, according to W. H. Caine, chairman of the Port of New York Cold Storage Warehousemen's Association. Members of the association operate cold storage plants in New York, Jersey City and Newark and say they represent more than 95 per cent of the available public cold storage space in the metropolitan area.

Mr. Caine said recently published reports had indicated that surplus butter might have to be destroyed because of a lack of proper storage space. It is true that many millions of pounds coming here had caused "some congestion in a few areas," he said, but such congestion was not permanent and already numerous empty cold storage rooms were showing up in New York and elsewhere. "Members of the industry are taking care of all their customers satisfactorily," Mr. Caine asserted.

Frozen Fish Shipped From Newfoundland

THE first regular large shipment of frozen fish, fresh from the Grand Banks off Newfoundland has arrived in Toronto. The 2,900-ton Scottish freighter Dundee, carried 650 tons of cod, sole, haddock, halibut and ocean perch.

Marketing difficulties have forced Newfoundland fishermen to develop new techniques to make their products as appealing as possible, the shipping company said, so the fish now are being frozen instead of salted or smoked.



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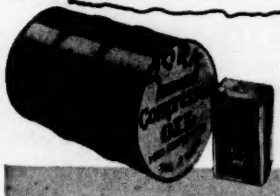

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on top of the liquid are at the same temperature, and the external vapor pressure is in equilibrium with the saturated vapor pressure of the liquid. Hence, no boiling nor bubbling. As soon as the cold water passes through the condenser, some of the ammonia gases are condensed, and the pressure in the receiver is reduced, causing violent boiling as evidenced by bubbles in the receiver gage glass.

During operation, this same thing frequently occurs but in a much less violent manner.—HGV

Rental Unit Charges

QUESTION NO. 1015: A room insulated with 4 in. of corkboard (8 x 21 x 8 ft. O.D.), is cooled to 36 F by ammonia in a Bush UCA 180 unit rated at 18,000 Btu with a temperature difference of 10F, or 27,000 with a 15 td.

It is used to store meat being prepared to make lunch meats. The meat comes in frozen and stored in room while thawing partly, then cut into chunks, taken out of room and ground into barrels and returned into room until needed.

At present they are putting about 5000 lbs through room. I cool this room for the meat firm and they like to have a flat charge per month. Any information on charges certainly will be appreciated.—R.G.M., MAL.

ANSWER: No. 1. For leased space in the Chicago area, refrigerating firms receive from $1:45 to $1.55 per ton of refrigeration supplied to tenants. Where they supply pipe line refrigeration to tenants who have their own storages, they receive approximately 10 cents per cubic foot per month for 32F brine, and 12 cents per cubic foot per month for 31F brine and below. You do not indicate whether the room sketched was your own property or not, and that is why I am quoting both rates. —B.C.McK.

ANSWER No. 2. Here in Washington, D.C., we handle our pipe line refrigeration in the following manner: Under 3,000 cubic foot, 16 cents for 34 F brine ($300.-00 minimum monthly); 23 cents for 20 F ($450.00 minimum) and 30 cents for 5 F ($600.00 minimum).—W.F.B.

New Questions

Converting Ice Maker to Latent Heat Tank

QUESTION No. 1016: We have a 500-lb. ice-making unit which the customer would like converted to an ice building set-up, to be used in a creamery for cooling cream after pasteurization.

The ice maker consists of a one-ton capacity highside with 1½ hp motor. The evaporator consists of an insulated tank about 3 x 3 x 4 ft. inside measurements with submerged coils. The tank was filled with brine and ten 50-lb. ice cans were suspended in same. Fed by expansion valve (no equalizer). The outfit produced 500 lbs. of ice every 12 to 13 hours under actual conditions.

The creamery now has an ice builder which was to be adequate for their needs, but never has been. So they would like this other as auxiliary equipment.

Their present ice builder consists of a 2 hp condensing unit operating 4 cold plates, 2—36 x 42-in. and 2—36 x 54-in. spaced 6-in. apart in fresh water bath. One small plate and one large plate in series are fed by a Sporlan (type G) expansion valve; thus, 2 expansion valves are used. Electronic device controls thickness of ice.

My experience has been that the two section do not build equally. One section gets ahead — then the other. I figured that these expansion valves should have been of equalizer type or all placed in parallel. It never has been satisfactory. Originally it was designed to build enough ice to cool 2400 lbs. of cream from 65 to 40 F.

I would appreciate some advice on this problem. Perhaps there would be better evaporator coils for this purpose than plates. Perhaps the expansion valves should have been equalizer types, etc. — PMS, Wyoming.

Carbon Dioxide Uses

QUESTION No. 1017: Being interested in production of CO_2, I would like to know what information you have regarding present extensive uses for CO_2 (Carbon dioxide) in liquids and solids? — CJC, Iowa.

"Freon-12" Vs. "Freon-22" For Air-Conditioning System

QUESTION No. 1018: Recently our company had installed an air conditioning system using Freon 22. The unit is driven by a 20 hp motor. Cooling is with an evaporative condenser. There is one evaporator coil having one expansion valve with distributors. Assuming that design and installation is correct, I would like to have someone compare this system as to efficiency and cost of operation with a like system using Freon 12. Another question I would like to have answered is, "Why should our large

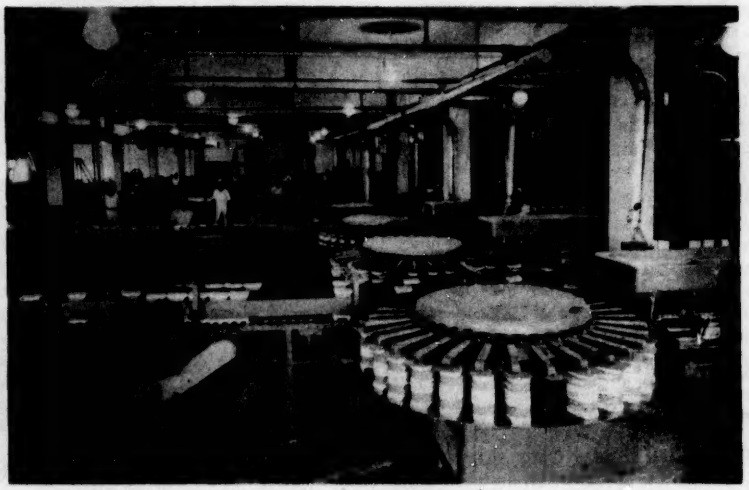
(Continued on page 44)

Delegates Will Tour Sugar Refinery

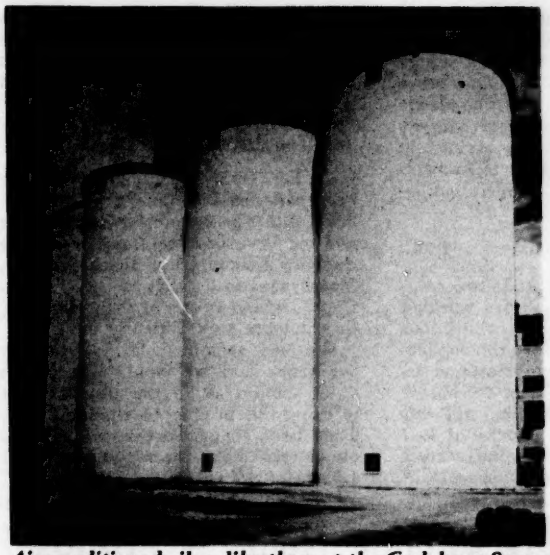
RESERVE, LOUISIANA, near New Orleans is an ideal spot for a sugar refinery, from the standpoint of being near the source, transportation facilities and other assets necessary to the production process. However, relative humidity ranging from 60-90 percent over 300 days a year created several handicaps.

The humidity problem prevented bulk storage of sugar, which was desirable since the growing of the raw material, sugar cane, is a seasonal production. Further complicating matters, unavoidable sugar dust in the air from the process, often combined with the humidity to form a syrupy film which not only hampered packaging operations and irrated personnel, but ultimately resulted in damage and deterioration to expensive process and packaging machinery.

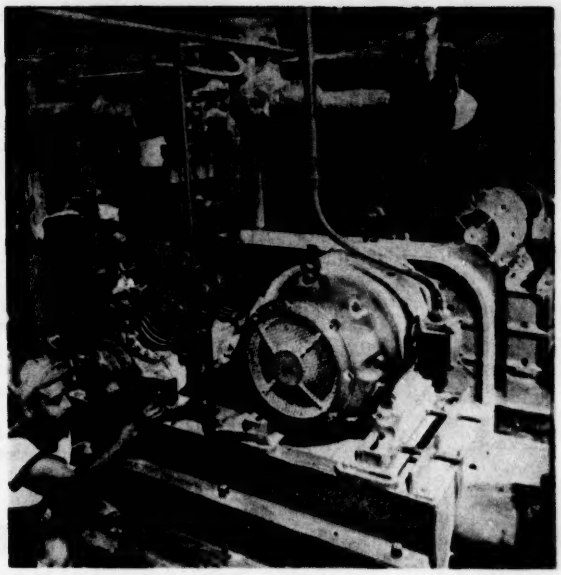
Recently, Godchaux Sugars, Inc. overcame this handicap by applying refrigeration and air conditioning to



Sugar packaging machinery in the plant of Godchaux Sugars, Inc., near New Orleans, can operate on a year-round basis when humidity inside the plant is controlled by air-conditioning. Before air-conditioning, relative humidity in the plant reached 60 per cent for more than 300 days of each year, and sometimes reached 90 per cent, with consequent lumping or caking of the sugar and gum-ups in the packaging machinery. Now the humidity is held to about 36 per cent. (Photo courtesy of Du Pont Company)



Air-conditioned silos, like these at the Godchaux Sugars, Inc., plant near New Orleans, La., permit indefinite storage of 22-million pounds of bulk sugar, regardless of outside humidity. (Photo courtesy of Du Pont Company).



Two 50-ton General Electric compressors are used in the "Freon-12" (dichlorodifluoromethane) system to maintain 85 F. temperature and a relative humidity of 36 per cent. (Photo courtesy of Du Pont Company)

their manufacturing, storing and packaging phases of sugar refining. They have extended an invitation to NAPRE to tour their plant, during the 45th annual meeting of the Association, which will be held in New Orleans at the Roosevelt Hotel, November 2-4.

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Write for Complete details.

COMPLETE SUPPLIERS TO THE ICE INDUSTRY

when practical, Godchaux's engineers constructed three air conditioned silos (Fig. 1). These silos, of concrete and steel construction, capable of storing 22,000,000 pounds of bulk sugar, each have a wooden lining two inches off the inside wall. In the two inch air space is circulated air of proper temperature and humidity which prevents the sugar from lumping or caking. Bulk sugar is stored in these silos and is withdrawn for packaging as orders come in.

The same air conditioning system which maintains the silos at 85 F and 36 rh. is used to condition packaging machinery spaces. In Fig. 2 will be seen a half dozen sugar packaging lines operating today free from gum-ups and costly maintenance headaches. In addition to the air conditioning, some of the machinery is additionally protected against corrosion and product contamination by plastic coatings.

Refrigeration Plant

The refrigeration condensing plant used in connection with this system consists of two 50-ton General Electric compressors and associated equipment (Fig. 3). The refrigerant is "Freon-12".

The field trip to Godchaux's sugar refinery completes a well rounded educational program to be presented in November, according to A. E. Wegener, past national president, NAPRE, and general chairman of the New Orleans convention. The tour to Reserve will be on Wednesday afternoon, November 3. Small groups of engineers will be personally escorted by production and engineering personnel, who will explain in detail, production processes, engineering applications, and the advantages of the newly installed air conditioning system.

Heinz Plant Refrigeration Obstructed by Strikers

STRIKING powerhouse workers at H. J. Heinz plant Leamington, Canada blocked company officials from starting refrigeration units in an attempt to save $500,000 in perishable ingredients. Power to refrigeration storage was cut off when 21 members of Local 944, International Union of Operating Engineers (A.F.L.-T.L.C.) walked off the job.

E. E. Litt, manager of personnel, said an attempt by L. C. Marshall, factory manager, to turn on refrigeration units was blocked. He said if goods such as butter, egg yolks, meat, etc., spoil it may mean the plant will be closed for an extended period.

(Continued from page 42)

manufacturing companies even think in terms of F22 for air conditioning? What is wrong with F12?" One other thing, I am aware of the volumetric efficiency of the F-22 system with its line sizes smaller and the savings in weight cost. What I want to know is the over-all efficiency of operation. — S.A.C.—Indiana

Ice Production Problems

QUESTION No. 1019: If two compressors of different rpm are working on one ice tank, and the connections are made in this way that the connections of the smaller compressor is attached in the connections of the bigger one, then what will happen, will this system not give more blocks of ice? Would you please advise the correct system? Will it not give more blocks of ice having the same rpm of the compressor but making the ice tank larger than actually is sufficient for the same compressor or plant? M.A.Q.

Rust Prevention for Ice Can Interiors

QUESTION No. 1020: We have been experiencing quite a bit of difficulty with rust forming in our ice cans and we have been approached by the Sudbury Laboratories, South Sudbury, Mass., suggesting that we use "Aqua-Clear", which is one of their products, to eliminate this difficulty.

We use sodium chloride brine in our tanks and we would like to get your opinion as to the practicability of using this product to eliminate rust. They have suggested that we use one ounce of "Aqua-Clear" to each 100 gallons of water. — AAL, Alaska.

A S R E May Change Name — Proposal Offered At Annual Mid-Year Meeting

THE celebration of its fiftieth anniversary was observed by the American Society of Refrigerating Engineers at its annual mid-year meeting held at the Olympic Hotel, Seattle, Wash., July 11-14. Occasion of this observance was at the open luncheon when Edward Simons, past president, presented formal charters to a number of Sections whose original charters are no longer available.

Following action at the meeting, members will be asked to vote on a new name: "American Society of Refrigerating and Air Conditioning Engineers." The move to change the name came from the New York and New Jersey Sections. This they said, would give recognition to the tremendous advance in the demand for air-cooling systems.

Considerable opposition to the change was expressed by a number of members who objected to putting the question to a vote of the general membership without further study.

Other changes in the Society's constitution would stiffen qualifications of for "members" and "associate members," and establish a new grade of "affiliate member" for non technical personnel. Another amendment would change the annual meeting date from winter to mid-year.

Technical Sessions

An air conditioning conference was held on the subject of room air conditioners, with particular emphasis on the part of the public utilities and the necessity for closer cooperation between engineers and the two groups, with respect to such problems as the effect of low poer power factor, the necessary requirements, and related items.

An innovation in the program was a series of four forums at which discussions were held on (a) Oil Problems with "Freon-22"; (b) Capillary Tubes vs. Expansion Valves on commercial self-contained air conditioners; (c) Refrigeration problems in the meat packing industry; (d) New thinking on short form air conditioning load calculations. These forums consisted of informal non-recorded round table discussions.

Suggestions for research projects and subjects for future technical papers, it was expected would result from these discussions. This proved a very important part of the program and the success of this first venture encouraged the committee to announce that six such forums will be held at the next ASRE national meeting to be held November 28 to December 1 in Philadelphia.

At the session on mechanical refrigeration of railroad cars, K. V. Plummer of Pacific Fruit Express said that while mechanical systems are necessary for frozen foods, when it comes to fresh fruits and vegetables, he thought the ice man would be with them for a long time.

The second technical session covered insulation details, at which conductivity tests on twelve commercial insulation at minus 200 F were reviewed by J. D. Verschoor of Johns Manville Research Center, who reported that the "k" factor varies from 0.11 for one type to a high of 0.35 for another.

Refrigeration Conference

A REFRIGERATION conference will be held at Columbia University, New York, September 13-15, which is celebrating its 200th anniversary this year. Participating in the conference will be The Refrigeration Research Foundation which is marking its 10th anniversary; the Engineering School of Columbia, which is celebrating its 60th anniversary; American Society of Refrigerating Engineers celebrating its golden anniversary; and the Refrigeration and Air Conditioning Section of the American Socity of Mechanical Engineers, which is observing ts 20th year of activity. Reservations, which will be limited, should be sent to Prof. Carl F. Kayan, Dept. of Mechanical Engineering, Columbia University, New York 27, N.Y.

India Cold Storage Plant For Milk Processing

A COLD storage plant for processing milk and milk products at Bombay, India, is expected to start operation by October 1955. It will include a plant for milk processing and drying. Announcement was made by Mrs. M Chandrasekher, Deputy Health Minister, that distribution of milk and other products produced by these plants would begin immediately after construction was finished. A condition that the allocation of $225,000 to the Bombay Government to construct these plants was that the government would distribute milk to the aggregate value of 1.5 times the cost of the plant during the first five years to expectant mothers and children who were in the first priority group. The distribution would be undertaken by the Bombay government.

Predicts Huge Growth In Air Conditioning

BY 1960, the air conditioning industry will be a four billion dollar a-year business, predicts Cloud Wampler, president of Carrier Corporation, in the July 19 issue of Newsweek magazine. The largest single part of the industry will have become home air conditioning, says Mr. Wampler, and by 1963, it will have leveled off at a five billion dollar figure. The Newsweek story reviews the progress of commercial air conditioning and the many sided aspects of its future.

Whale Show Refrigerated

ACCORDING to information reaching INDUSTRIAL REFRIGERATION, Jonah is now a refrigerated whale. Captured and killed September 11, 1952, its interior organs were removed and 2500 gallons of formaldehyde were pumped into the 58-ton mammal. Jonah went touring Europe after that.

Recently a certain fragrance was noted which cost Jonah his popularity. His owners decided to refrigerate in order to delay decay. The whale now has three 32 F evaporators in his belly; all hooked up to a plant installed in the truck.

India Railway Increases Air Conditioning Service

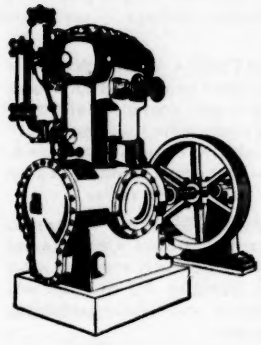
FREQUENCY of air conditioned service on the Bombay-Madras, India Express has been increased from two to four per week in each direction. The increased service began May 3 from Bombay and from Madras May 6. Air conditioned coaches will run from Bombay on Saturdays, Mondays, Wednesdays and Fridays and from Madras on Mondays, Wednesdays, Thursdays and Saturdays.

PARA-XYLENE:

★ A New Phillips Product

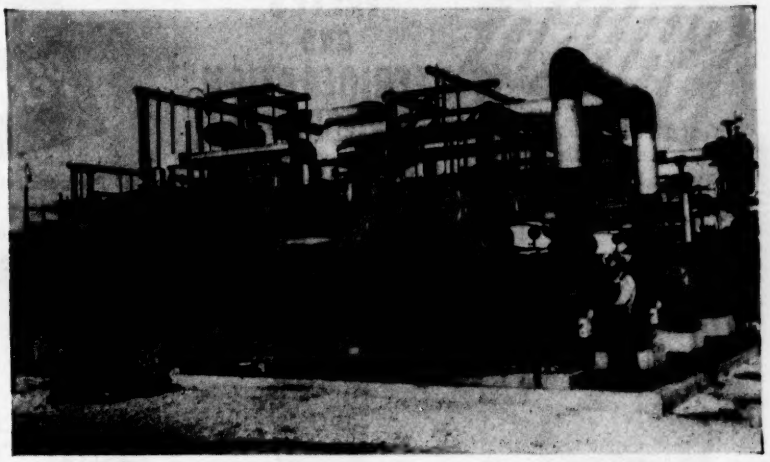
★ A New Application of

FRICK Refrigeration



Frick two-cylinder enclosed refrigerating compressor similar to those installed at Big Spring. Also, complete line of "ECLIPSE" multi-cylinder compressors for any refrigerant and any service.

Below Right: Three of the six Frick refrigerating machines in service at Big Spring, Texas.



Phillips Chemical Company's new plant near Big Spring, Texas, is the first in the country to produce 98% pure para-xylene (used in the manufacture of a synthetic fiber) in commercial quantities.

The new, revolutionary process, patented by Phillips, involves continuous fractional crystallization. The heart of the system is a Frick "cascade" low-temperature refrigerating plant that FREEZES OUT para-xylene crystals.

Whether *your* process is in the idea, development or production stage — if it involves refrigeration or air conditioning, get in touch with your nearest Frick representative, or write directly to

Frick representatives are located in principal cities throughout the U.S.A.

FRICK CO. DEPENDABLE REFRIGERATION SINCE 1883 WAYNESBORO, PENNA. U.S.A.

Frozen Cooked Potato Production Increases

THE total pack of Frozen Cooked Potato Products in 1953 was 70,691,174 pounds, according to a special survey just completed by the National Association of Frozen Food Packers. It has been generally understood that the volume of these products has increased rapidly in the past few years, but prior to this survey no authoritative data on their production has been published.

The lion's share of the total production of Frozen Cooked Potato Products, 60,005,764 pounds, was frozen French fried potatoes. The remaining 10,685,410 pounds represented a variety of products, including frozen whipped, diced and shredded potatoes and frozen potato puffs.

The retail pack of frozen French fried potatoes totalled 56,140,934 pounds. This volume was mostly in a 9 oz. size. The bulk and institutional pack of frozen French fries amounted to 3,864,830 pounds.

The other Frozen Cooked Potato Products (whipped, diced, shredded, etc.) were also packed principally in retail sizes — 9 oz., 12 oz. and 14 oz.

Florida Safety Meeting

PANEL discussions of industrial safety problems of the ice industry highlighted a regional safety meeting sponsored at Miami, Fla. July 15 by the Florida Industrial Commission. L. H. Stein, safety director of City Products Corp. presided.

The meeting was part of a 12-month safety drive the Industrial Commission is backing in the ice industry. The program, which started January 1, has reduced work days lost in the industry due to injuries from 8,376 in the first six months of 1953 to 1,292 for the same period this year.

Milwaukee Skating Rink Opened to Public

A PLAN has been devised by Elmer Krahn, manager of the Milwaukee Arena to open the ice rink originally intended for ice shows and hockey games, to the public for skating. The idea was approved in a recent editorial in the Milwaukee Journal. The rink and its construction was described and illustrated in the June 1950 *Ice and Refrigeration*.

National Safety Congress

THE annual National Safety Congress and Exposition will be held in Chicago, October 18-22. More than 12,000 persons from all over the world will hear 600 program participants at 200 sessions discuss the latest advances in accident prevention.

Safety personnel in all fields — industrial, traffic, farm, school and home — will find new information and techniques to assist them in saving lives. In the industrial field alone, 25 complete programs conducted by the industrial sections of the National Safety Council will include automotive and aircraft manufacture, metals, printing, petroleum, mining, food, construction, public utilities, wood products and many others.

Training Conference

A NATIONAL refrigerated warehousing training conference will be held in Chicago in February, 1955, sponsored by the National Association of Refrigerated Warehouses and the Refrigeration Research Foundation. Place and date will be announced later.

SHANK

AMMONIA VALVES AND REFRIGERATION PRODUCTS

RELIEF VALVES

For Ammonia and Freon. One Piece body design—rustproof finish. Internal construction—stainless steel—will not corrode. Positive relief action. Pressures from 75 to 400 lbs.

3-WAY DUAL SHUT-OFF VALVE

For use where Refrigeration Codes require dual relief valve installations. Stainless steel stem. Indicator plate on hand wheel shows position of valve shut off. Completely rust-proofed.

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Permamix-C for patching in temperatures from 5° above to 30° below zero.

DRY TAMP MEANS SPEED • No sticky mass to dig out of the drum or to handle • Permamix dry pours • sets instantly • feather edges perfectly • no production delays • non-skid surface.

ALL TEMPERATURE • Won't freeze • can be stored or used in *any* temperature • will store indefinitely • a stock room item • will not "set" in drum whether open or covered. Mistakes just can't happen. Tamp in place and traffic rolls.

CUTS MAINTENANCE COSTS on concrete, brick, tile or asphalt floors • no special equipment or skill needed • a one man job • comes in durable 50 lb. net wt. fibre drums • solve your floor patching problems for good.

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Shipments of Air Conditioning and Commercial Refrigerating Equipment – 1953

THE VALUE of manufacturers' shipments of components and accessories for air-conditioning and refrigeration equipment during 1953 amounted to $293 million, according to the Bureau of the Census, Department of Commerce. Shipments of condensing units in 1953 totaled 966 thousand, valued at $74 million, compared with 654 thousand units, valued at $61 million shipped in 1952. A total of 2,380,739 compressors and compressor units valued at $121 million, were shipped in 1953, representing an increase of 42 percent in number and 70 percent in value over 1952 shipments. The value of heat-exchanger equipment shipped in 1953 was $83 million, an increase of 30 percent from the previous year's total of $64 million. Shipments of centrifugal refrigeration systems increased from 363 units in 1952 to 469 units in 1953.

Manufacturers' shipments of self-contained air-conditioning units totaled 1,137,293 valued at $294 million, representing increases of 159 percent and 117 percent, respectively, over the quantity and value of units shipped in 1952. Shipments of room air-conditioners (1½ horsepower and under, including window-sill type) amounted to 1,044,691 units valued at $199 million, in 1953 representing an increase of 175 percent in the number of units and 169 percent in value over 1952. For 1953, statistics for manufacturers' shipments of heat pumps were collected for the first time in this series. During 1953, manufacturers reported shipments of 986 heat pumps, valued at $1.6 million. The year 1953 was the first year for which separate shipments data are published for refrigeration chassis for air conditioning. These shipments totaled 20,363 units valued at $10 million.

Tables Show Data

Table 1 presents a historical summary of the quantity and value of shipments of air-conditioning and refrigeration equipment by class of product for the period 1949 through 1953. Other tables show the quantity and value of shipments of condensing units for 1952 and 1953; 1952 and 1953 data on quantity and value of shipments of compressors and compressor units, and number of compressor bodies manufactured (a compressor body being defined as the basic compressor castings); data on heat-exchanger equipment, and figures for self-contained air-conditioning units and other types of air-conditioning and refrigeration equipment.

Scope of Survey

The figures on quantity and value of shipments in this report represent completed sales of equipment, i.e., units actually billed and shipped. Complete units delivered on consignment or shipped to a branch warehouse for stock are not included until such time as they are actually sold. The dollar values shown are the man-

(Continued on page 51)

TABLE 1.—AIR-CONDITIONING EQUIPMENT AND COMPONENTS AND ACCESSORIES FOR AIR-CONDITIONING AND REFRIGERATION EQUIPMENT: QUALITY AND VALUE OF SHIPMENTS, BY CLASS OF PRODUCT, 1949-1953 (Value figures in thousands of dollars)

Class of product	1953		1952*		1951		1950		1949	
	Number	Value	Number	Value	Number	Value	Number	Value	Number	Value
Condensing units, total	966,136	$74,013	654,223	$61,439	840,176	$75,672	885,913	$75,833	610,341	$53,534
Ammonia refrigerants	158	214	209	300	240	404	245	352	254	346
Refrigerants (except ammonia), total	965,978	73,799	654,014	61,139	839,936	75,268	885,668	75,481	610,087	53,188
Air-cooled	920,947	55,958	616,215	47,359	796,303	58,624	835,239	59,035	570,280	40,127
Water-cooled	45,031	17,841	37,799	13,780	43,633	16,644	50,429	16,446	39,807	13,061
Compressors and compressor units, total	2,380,739	121,054	1,677,300	71,047	1,051,937	56,669	954,368	46,977	604,431	29,929
Ammonia refrigerants	2,251	5,952	1,825	4,708	2,401	6,465	2,652	6,756	2,240	5,620
Refrigerants (except ammonia)	2,378,488	115,102	1,675,475	66,339	1,049,536	50,204	951,716	40,221	602,191	24,309
Heat-exchanger equipment, total	...	82,602	...	63,666	...	64,935	...	61,337	...	40,925
Evaporative condensers	5,508	8,647	4,873	7,179	6,216	8,652	7,818	8,869	4,798	5,850
Air-conditioning units (not self-contained)[1]	59,682	18,918	43,399	14,344	33,263	14,636	29,704	11,671	30,044	7,997
Unit coolers, refrigeration	89,532	13,489	75,854	11,111	88,718	12,660	103,596	12,917	65,806	7,710
Other heat-exchanger equipment[1]	...	41,548	...	31,032	...	28,987	...	27,880	...	19,368
Self-contained air-conditioning units, total	1,137,293	293,644	[2]438,464	[2]135,579	282,488	93,573	257,263	86,913	123,709	50,584
Window-sill type	1,017,699	191,129	372,064	70,323	228,964	42,442	187,224	31,373	78,454	14,425
Other than window-sill type	119,594	102,515	[2]66,400	[2]65,256	53,524	51,131	70,039	55,540	45,255	36,159
Other air-conditioning and refrigeration equipment, total	...	61,567	...	[3]41,898	...	[3]36,537	...	n.a.	...	n.a.
Centrifugal refrigeration systems	469	14,970	363	14,040	441	15,300	382	12,249	285	8,189
Ice-making machines	28,228	14,385	26,693	12,838	12,998	8,804	14,914	8,907	6,902	4,641
Refrigeration chassis for air-conditioning	20,363	10,298	[2]6,396	[2]2,706	7,728	5,863	n.a.	n.a.	n.a.	n.a.
Year-round air-conditioning units (self-contained, except heat pumps)	12,862	12,148	4,077	4,170						
Heat pumps	986	1,613	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Mechanical dehumidifiers, refrigeration type	90,551	6,151	89,152	6,431	75,659	4,731	n.a.	n.a.	n.a.	n.a.
Absorption and adsorption systems and equipment	213	2,002	119	1,713	138	1,839	(d)	(d)	(d)	(d)

*Revised.
n.a. Not available.
dWithheld to avoid disclosing figures of individual companies.
[1]Represents unit coolers, air-conditioning, for 1951 and earlier years. Also, data for surface dehumidifiers which for 1951 and earlier years were included with "Unit coolers, air-conditioning" are included in "Other heat-exchanger equipment" for 1952 and 1953. Separate data for surface dehumidifiers are not available prior to 1952. (See table 4 for detail on value of shipments of this item for 1952 and 1953.)
[2]1952 data for self-contained air-conditioning units designed especially for use in year-round air-conditioning systems are included under "Refrigeration chassis for air-conditioning."
[3]Does not include data for heat pumps which were not collected for years prior to 1953.

AWA Backs Anti-Government Competition Board

THE Federal Government is the largest warehouse operator in the world, operating upwards of 560 million square feet of refrigerated and merchandise warehouse space, according to testimony given by the American Warehousemen's Association before the House Committee on Government Operations on July 15, 1954.

The Association, which represents nearly 1000 privately operated refrigerated and merchandise warehouses throughout the country, was testifying in support of H. R. 8832 which would create an "anti-Government competition board" to eliminate Federal competition with business-type activities.

Extent of Warehousing

AWA told the Committee that its industry operates 165 million square feet of storage space, well distributed across the country to provide storage for all types and classes of general merchandise and perishable products. It pointed out that these warehouses are currently operating at 70-75 per cent capacity.

Testimony revealed that the military is by far the largest Government warehouse operator. According to a 1948 Hoover Commission Report, the military operated at that time, nearly 530 million square feet of storage space and required the services of 103,000 persons to man and administer these facilities and their functions. The salaries of these people were over $263,000,000.

Other Federal agencies mentioned in the testimony were the General Services Administration and the Veterans Administration — both of whom operate considerable warehouse space. Altogether, the government operates over 3 times the amount of warehousing space the entire private warehouse Industry does.

Private Facilities Available

AWA pointed out to the Committee that it believed a large part of the storage activity being performed by the Government could be done at less cost by privately operated warehouses without impairing Government efficiency. The Federal income tax loss alone, the Association conservatively estimated, amounts to $56,000,000 annually.

The Association further declared that actual cost computing in government warehousing operations is unrealistic and does not include all elements of cost which private warehousemen are obligated to include when determining their costs. It recommended a full investigation of government costs by certified accountants.

Other Factors and Advantages

Other factors and advantages of commercially operated storage facilities, the Association urged the Committee to consider included:

1. Private industry has the experience and know-how to do the job better and at less cost, when all real costs are taken into consideration.
2. There is adequate warehouse space available throughout the country to meet all reasonable Government requirements, if Government space was turned over to private operators wherever possible. If a shortage of space existed anywhere that need would be supplied readily if the government would remove the competitive axe that constantly hangs over the heads of warehousemen.
3. Besides depriving the Federal treasury of needed taxes, Government competition also deprives states and municipalities of needed taxes they would otherwise collect from private business.
4. Use of private facilities gives the Government greater flexibility and avoids the expense of maintaining frequently idle facilities; the government would pay for only that space actually used.
5. Government competition discourages industry expansion and venture capital, so essential to a healthy economy, and restricts the addition of new facilities which would be badly needed in an emergency.

Butter Sold For Export

THE U. S. Department of Agriculture has announced two sales of Commodity Credit Corporation-owned butter totaling 106,176 pounds, both to Armour and Company, Chicago, for commercial export to the Philippine Islands.

One sale of 67,392 pounds of U. S. Grade B butter was at 37.275 cents per pound in store at St. Paul, Minn., for shipment to the Philippines via the port of Seattle. The other of 38,784 pounds of U. S. Grade B butter was for 36.838 cents per pound for shipment also to the Philippine Islands but via the port of San Francisco. Including these two sales, 403,562 pounds of CCC-owned butter has been sold for commercial export at prices in line with world butter prices.

DIMCO CAST ALUMINUM FIN EVAPORATING COIL

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★ *Saves Weight*

★ *Saves Cost*

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DETROIT ICE MACHINE COMPANY

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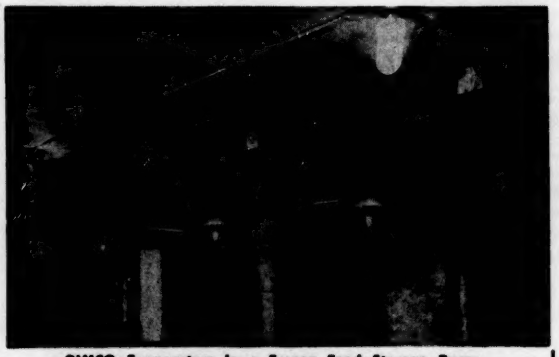

DIMCO Evaporators in a Frozen Food Storage Room at great Lakes Terminal Warehouse, Toledo, Ohio. A typical installation facilitating palletizing.

Retention of Quality in Stored Peaches

A STUDY of the retention of high quality in stored peaches has been made and results published by the Horticultural Products Laboratory, Vineland Station, Ontario, Canada. Authors were J. H. L. Truscott and R. F. Crowther.

Harvested peaches are generally assumed to be highly perishable by both growers and the trade, the report states. It is further assumed that a peach harvested in a very firm condition is less perishable than one which is softer. As a consequence there is a tendency to harvest peaches which are quite firm. High prices at the beginning of the peach season encourage early harvest of very firm fruit, and the same tendency occurs when intervals between harvests of varieties result in strong demand.

Based on this study, the following suggestions are offered as reliable advice to those who wish to guarantee that the consumer will receive high quality peaches.

1. Harvest the fruit at a maturity which will ripen at room temperature in three days or less. The permissible softness of the fruit will depend largely on how much care the grower and all other handlers are willing to exert to prevent undue bruising. If the fruit must be harvested in a less mature condition it should be kept out of refrigeration until it reaches a desirable maturity.

2. The fruit should reach the consumer within two weeks. Meanwhile it should be held at temperatures not exceeding 40 F. Preferable the temperature should average close to 32 F.

Gas Storage of Peaches

A STUDY of gas storage or "modified atmosphere storage," has been made by the Horticultural Products Laboratory, Vineland, Ontario, Canada. Author was J. H. L. Truscott.

The report states that gas storage has had attention from a number of investigators. Except that for reports that desirable effects were obtained from high concentrations of carbon dioxide during short-term transport, most other reports indicate that the method has little value for longer storage of peaches.

The conclusion from this study indicated that gas storage is not likely to be of commercial value in long-term storage of Niagara grown peaches, and no further investigation of its application to peaches are planned.

Refrigeration and Air Conditioning in India

THE ANNUAL General Meeting of the Central Council of the Refrigeration and Air Conditioning Trades Associations of India was held recently in Calcutta. Ahmed Fazalbhoy, managing director of Messrs. Ahmed A. Fazalbhoy Ltd., Bombay, was elected president; J. C. Kapur, director of the Air Conditioning Corp. Ltd., Bombay, vice-president and B. B. Ghosh of Calcutta, secretary for the current term of two years.

The Central Council is a representative all-India body whose membership is made up of the Refrigeration and Air Conditioning Trades Associations of Bombay, Calcutta, Delhi and Madras and deals with all important problems connected with the manufacture of air conditioning and refrigeration equipment, imports from abroad and the development of this essential trade and industry on a planned basis in that country.

Mr. and Mrs. Ahmed Fazalbhoy have founded the Munir Fazalbhoy School of Refrigeration and Air Conditioning Engineering. This school is the first of its kind in this country open to students of all communities.

Polar Processed ICE VENDOR

- SELLS CUBED AND CRUSHED ICE
- OPENS NEW OUTLETS — INCREASES ICE SALES
- NOW AVAILABLE IN DOUBLE AND SINGLE MODELS
- SHIPPED ASSEMBLED AND WIRED — READY TO OPERATE

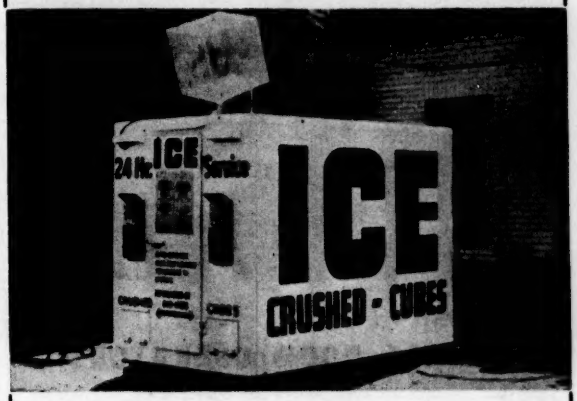

Photo: Model C-2 (Double Unit) POLAR Processed Ice Vendor. This unit sells handy packages of both cubed and crushed ice.

Conveyor Capacity (each belt) 40 10# bags — Storage Capacity 350 10# bags

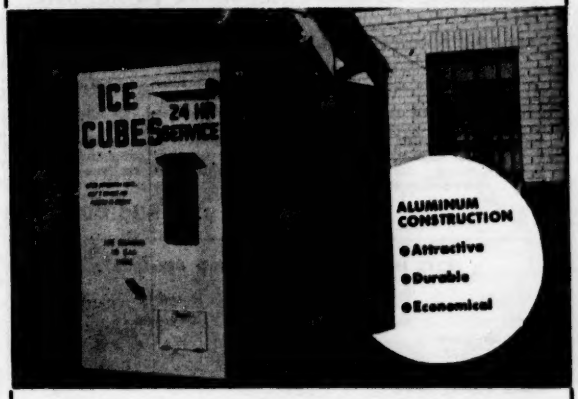

Photo: Model C-1 (Single Unit) POLAR Processed Ice Vendor. This unit sells one product.

Belt Capacity 40 10# bags — Storage Capacity 200 10# bags

The year 'round demand for processed ice is increasing! You can make cubed and crushed ice available in all convenient locations in your city with POLAR Processed Ice Vendors. The investment is surprisingly low!

Write or Wire Today for descriptive literature and prices. Dept. I-9.

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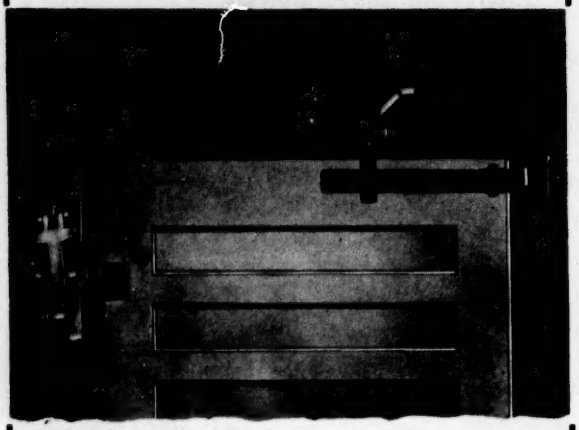
Prevent
COLD ROOM LOSS



with . . .

AIR-LEC DOOR OPERATORS

Air-Lec, shown installed above the cooler door, opens and closes the heaviest doors quickly, safely and smoothly at the touch of a switch or the light pull of a cord. Available with Mechanical Trip for one or two operating stations above each door approach, or with Electrical Switch for more and distant stations. Air-Lecs are in use in thousands of factories, food freezing and storage plants, meat packing companies, garages and service stations. Speed and Safety are characteristic of Air-Lec because Air-Inertia-Spring, all elastic forces, are the patented forces used.

AIR-LEC FOR TYPICAL COOLER DOOR. . **$65.00**

. . . AND AIR SEAL

Installed at left of door in illustration, the Air Seal operates in conjunction with Air-Lec, to provide an absolute seal on cooler doors. Air Seal crowds the outer edge of the door to stop improper circulation and frosting. Air Seal is especially desirable where temperatures below freezing are maintained.

AIR-SEAL. $25.00

NOTE HOW THEY RE-ORDERED AIR-LECS

	Recently Ordered	Now Enjoy
U. S. Growers Vernon, Calif.	4	8
Dewey & Almy Chemical Co. Cedar Rapids, Iowa	3	5
Bangor Fruit Exchange Bangor, Michigan	2	4
Produce Terminal Cold Storage Chicago, Ill.	1	7

Fill in and return the coupon today for complete information.

SCHOELKOPF MFG. CO., Madison. Wis.

Cooler Doors are ___ Ft. Wide, ___ Ft. High. Air Pressure ___

Open Toward Warm Side, Cold Side.

Firm Name _____

Address _____

By _____

SCHOELKOPF MANUFACTURING CO.

312 N. THIRD ST., MADISON 4, WIS.

Avoid Back Strain When Lifting Objects

WHEN lifting heavy objects, injury may be avoided by keeping the back and shoulders straight, bending knees until the object may be securely grasped, keeping the feet reasonably close together, (ten to twelve inches), and then straightening the legs. This puts the strain on the strong leg muscles rather than on those of the back and abdomen.

Size up the load — if it is excessive weight, call for help — or use mechanical equipment. Secure grasp will help to prevent off-balance strain, and to prevent dropping, with consequent danger to the worker or damage to the object being lifted.

New Concentrate Plant

CONSTRUCTION of $1,250,000 concentrate plant in Haines City, Fla., has been started by Citrus, Inc. The plant designed to handle frozen vegetables as well as frozen citrus products will be ready for operation this Fall. President of the new firm is Emory Cooke, Atlanta, Georgia.—NARW Cold Facts

COMING CONVENTIONS

NATIONAL ASSOCIATION PRACTICAL REFRIGERATING ENGINEERS
November 2-4, 1954
Roosevelt Hotel, New Orleans, La.
J. RICHARD KELAHAN, Secretary

NATIONAL ASSOCIATION ICE INDUSTRIES
November 9-12, 1954
Netherland Plaza Hotel, Cincinnati, Ohio
GUY W. JACOBS, Executive-Secretary

FLORIDA ICE ASSOCIATION
November 21-23, 1954
Miami, Florida
MURIEL WASHBURN, Secretary

NATIONAL EXPOSITION OF POWER AND MECHANICAL ENGINEERING
December 2-7, 1954
Commercial Museum and Convention Hall, Philadelphia, Pa.
E. K. STEVENS, Manager

HEATING AND VENTILATING EXPOSITION
January 24-28, 1955
Commercial Museum and Convention Hall, Philadelphia, Pa.
E. K. STEVENS, Manager

Profit in the Ice Business

(Continued from page 26)

preparing for a better year in 1954. The company operates five ice manufacturing plants scattered over the city. Daily production is 350 tons and storage capacity in three different buildings is 24,000 tons.

Ice is sold: retail through domestic routes, to peddlars; wholesale to dairies, bakeries, fisheries, vegetable importers, hospitals and paint companies. The ice cube and cracked ice business is increasing and there is also a railway contract.

Four vending stations were operated last year and four new ones are being added, also two refrigerated trucks.

Advertising is through direct mail to grocers, butchers, restaurants, taverns, hotels, dairies, bakeries, through different newspapers all year round between four and eight times a week, through magazines, exhibitions, etc. Articles in newspapers, also radio and television programs glamorize the business. The picture of an ice sculpture or a vending station or a high lift truck icing a refrigerator car or a dump truck that loses a load of ice in a hill in the business section are examples of publicity stories.

Getting new customers is hard but the secret is to keep them, says G. Brunelle, Manager. They keep in touch with them through employees, letters, telephone and sometimes personal calls.

Refrigerated Warehouses Receive Safety Awards

NINE refrigerated warehouses have been awarded Safety Certificates for outstanding plant safety records by the National Association of Refrigerated Warehouses. The plants qualified by going one year without a lost-time industrial accident. They are:

Beall Refrigerating Co., Santa Clara, Calif.; Central Storage and Warehouse Co., Inc., Madison, Wis.; Colonial Ice Co., Greensboro, N. C.; Colonial Ice Co., Roanoke, Va.; Fairmont Foods Co., Columbus, Ohio; Fairport Storage and Ice Corp., Fairport, N. Y. Standard Ice and Fuel Co., Charlotte, N. C.; Terminal Cold Storage and Ice Co., Dayton, Ohio; and Union Ice Co., Chico, Calif.

Including these latest awards, a total of 42 refrigerated warehouses have received safety awards since NARW launched its industry-wide safety campaign last year.

New Refrigerated Warehouse

(Continued from page 28)

Preston M. Geren has been retained as architect and engineer for the structure.

The United States Cold Storage Corporation is one of the three largest operators of refrigerated storage in the country. In addition to the new plant in Forth Worth other plants are located in Chicago, Dallas, Detroit, Kansas City, Omaha and Port Lavaca, Texas.

Cooling Tower Performance

(Continued from page 15)

as for sea level but with about one-quarter decrease in fan horsepower.

The author wishes to acknowledge the assistance of Lilie-Hoffmann Cooling Towers, Inc. in supplying equipment and also practical advice on cooling tower construction and operation.

Shipments of Air Conditioning and Refrigeration Equipment

(Continued from page 47)

ufacturers' net billing prices, f.o.b. factory.

This release presents data for all known companies manufacturing components and accessories for air-conditioning and commercial refrigeration and complete air-conditioning equipment of the types specified. The 1953 figures are based on reports received from 129 companies on Census Form MA52A.

Any inquiries concerning these data should be addressed to the Bureau of the Census, Industry Division, Machinery and Equipment Section, Washington, D. C.

Frozen Asparagus Declines

THE frozen asparagus pack this year was 23 percent smaller than the record pack of 1953, according to a preliminary tabulation by the National Association of Frozen Food Packers. The 1954 pack total was 25,412,690 pounds as compared to 32,945,017 pounds produced last year. Even with this sharp reduction, however, the 1954 pack was about equal to that of 1952.

All major producing regions showed substantial pack reductions from 1953. While the retail pack dropped off 32 percent from 1953, the small institutional pack showed a small increase.

Road Signs Point to Ice

ROAD signs for the use of ice companies have been developed and are available for purchase by members of The Indiana Association

of Ice Industries. There are three separate signs, illustrated above, for posting on highways or streets.

New Research Projects

TRRF Project 50, entitled "Frozen Storage of Certain Species of Fresh Water Fish", has been approved by the Executive Committee of the Refrigeration Research Foundation. The work will be done by the U. S. Fish and Wildlife Service, Fishery Technology Laboratory, Seattle, Washington. Project leader is Dr. Maurice Stansby.

TRRF Project 51, entitled "Frozen Storage of Pacific Oysters", has also been approved and will be conducted in the same laboratory and under the same leadership as the fish storage project. It is planned to extend this research soon to include a study of frozen Gulf oysters also. These two projects are expected to aid important work that needs support. The projects are being initiated at once with Short Term Investigation Funds, with the approval of the Executive Committee, due to certain factors of urgency in getting them under way. The investigations will be provided for in the 1955 budget.

News of People

DAVID BERNARD, formerly mechanical superintendent for 11½ years with Fort Pitt Brewing Co. at the Sharpsburg and Jeannette Plants, is now in business for himself, buying and selling used machinery and equipment, also erecting and servicing plants of all kinds. Mr. Bernard has had 40 years of practical experience in erecting, operating, and repairing plants, including engineering work in breweries, dairies and packing houses.

G. DUDLEY ALLMAN, former AWA president recently returned to Chicago to live. He has spent his time in California since his recent retirement from U. S. Cold Storage Corporation.

WALTER E. BERND, formerly vice president (engineering) for Terminal Refrigerating & Warehousing Corporation, is now refrigeration engineering consultant to Merchants Terminal Corporation in Washington, D. C.

Beard Resigns From Merchants Refrigerating

THE resignation of John B. Beard, vice-president and general manager of Merchants Refrigerating Company of California, at Modesto, was effective August 1, 1954, to accept the presidency of the Beard Land & Development Company. Mr. Beard headed the California Company prior to its purchase in 1953 by the present ownership, and will continue as a director of the parent organization. Clive C. Berkley, manager of operations at the Modesto plant since 1945, and assistant vice-president, has been appointed vice-president and general manager of the Modesto operation.

DEATHS

Lloyd Roger Townsley

THE DEATH of Lloyd Roger Townsley occurred at his home in Chicago, August 14. He was 72 years old.

Mr. Townsley served as secretary of Nickerson & Collins Company, publishers of INDUSTRIAL REFRIGERATION and other business publications since 1909. He was a half-brother of the late Joseph N. Nickerson, founder of ICE AND REFRIGERATION, succeeded by INDUSTRIAL REFRIGERATION.

He was a graduate of the Armour Institute of Technology, Chicago. Following graduation he did construction work throughout the country on refrigeration plants for Larson-Baker Company. Among his other business activities he served as chief mechanic for Ray Harroun of Indianapolis, early automobile racer, and participated in some of the early 500-mile Indianapolis speedway races.

Private funeral services were held in Chicago, August 16.

Fred O. Wood

THE DEATH of Fred O. Wood, secretary of the Ice Service Company, Kansas City, Mo., occurred at his home in Kansas City, July 14, after an illness of six months. He was 71.

Mr. Wood was the last of three organizers of the Superior Ice and Coal Company, formed 35 years ago, which later became the Ice Service Co. Before that time he lived for a few years in New York City where he was employed in 1925 to organize, establish and publish an official magazine for the Shrine. He was a 33rd degree Mason and member of the Grand Chapter of Missouri.

Alvin H. Baer

ALVIN H. BAER, a well known figure in the refrigerating industry for half a century, died August 11 at the Point Pleasant (N.J.) Hospital. He had been vacationing at nearby Manasquan with his daughter, Mrs. C. P. Conrad, Lemoyne, Pa. He was 75 years of age.

Alvin H. Baer

Mr. Baer was born in Cumberland County, Pa., and when 21 moved to Waynesboro, where he was employed by Frick Company. For a decade and a half, ending in 1932, he was sales manager of the Refrigeration Division of the firm. Later he served as vice-president of the Carbondale Machine Company and of the Worthington Pump and Machinery Corporation. During World War II he worked for three years with the War Production Board. For some time he was stationed in Ottawa, Canada.

Mr. Baer was a past president of the American Society of Refrigerating Engineers and the American Institute of Refrigeration. He was a member of the Acadia Lodge F. & A.M., and was past master of the Lodge; a member of the Shrine of Harrisburg, and of the Trinity Lutheran Church of Lemoyne.

No Clog! No Fog! No Bogging Down! SELF-TENDING!

STERLING

*KOOLER KUBES

Save Work...Time...Trouble...Money!

*Trademark International Salt Company, Inc.

In Unit Coolers, Brine Spray Cold Diffusers, or Spray Deck Systems!

Heavily compressed 50-lb. refrigeration cubes . . . dissolve evenly . . . strengthen brine continuously and uniformly . . . eliminate labor, guesswork and waste in the handling and measuring of loose salt.

Always uniform. Constant Salometer strength reduces product shrinkage . . . icing of coils. Clean brine prevents clogging of spray nozzles . . . chill-room fog. Less salt . . . less work . . . better results all around!

Try Sterling KOOLER KUBES Today! Or, for information, write

INTERNATIONAL SALT COMPANY, INC.
Scranton 2, Pa.

MANUFACTURERS' NEWS

Henry Valve Observes 40th Year of Business

ESTABLISHED in 1914, the Henry Valve Company, Melrose Park, Ill. observes the 40th year of the founding of this well known company in Chicago by Guy J. Henry who continues as active president of the corporation.

The company started in the refrigeration industry manufacturing primarily ammonia valves and continued to expand its product line and manufacturing facilities in step with its progress. Today it occupies a modern factory in a Chicago suburb with facilities all on one floor for efficient production line manufacturing.

Henry Valve Company, over the years, has contributed a number of new and improved "firsts" to the refrigeration, air conditioning and low temperature fields. Typical of these "firsts" are the following:

Diaphragm Packless Valve with Balanced-Action
Permanent Mould Iron Body Compressor Valve
Dispersion Tube Drier
"Abso-Dry" Pressure Sealed Drier
"Dehydratector" the drier with built-in liquid sight port
One Piece Drawn Shell for driers and strainers
Tongue And Groove Distortion-Proof Flange
Diaphragm Snap Action Relief Valve
Tubular Steel Welded "Y" Strainer
Wing Cap Valve with Separable Brass or Steel Sleeves and Companion Flanges
"Wave-Flow" Diaphragm Check Valve
"Wave-Flow" Quick Coupler
"Make And Break" Truck Coupling Valve
"Sentry" Rupture Disc

Guy Henry, president Henry Valve Co. Chicago, Ill.

"Cross-Vu" Liquid Indicator
Packless Liquid Gauge Set
Bronze Wing Cap Line Valve with Integral Screw End Or O. D. Solder Ports and Swivel Disc

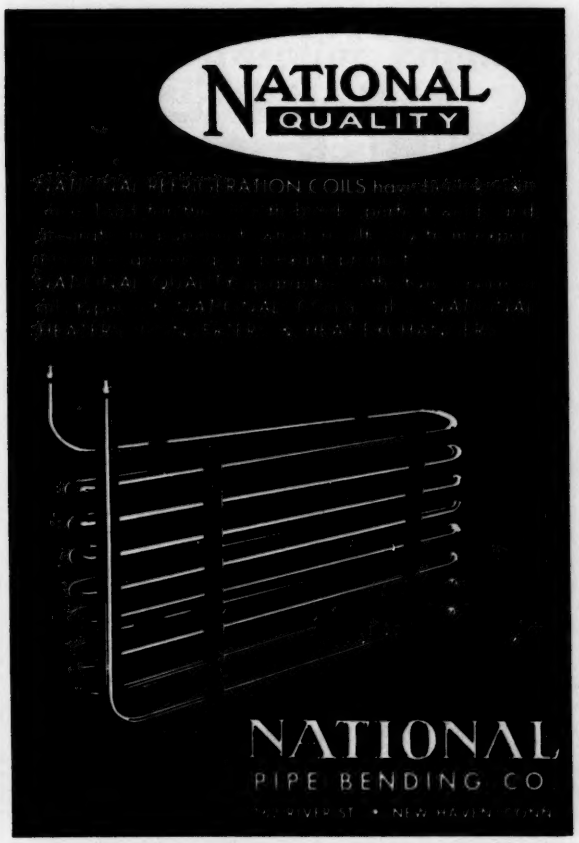
Carrier Recold Litigation Settled

CARRIER Corporation, and Refrigeration Engineering, Inc., of Los Angeles, California, owner of the Recold water defrost Patent No. 2,219,393, have settled all litigation pending between them.

As a result, the validity of the Recold water defrost patent stands unimpaired. In addition, Carrier has dropped its counter-claims against Refrigeration Engineering, Inc., and has accepted a license on the patent covering the Recold water defrost coil.

By virtue of this out-of-court settlement, Carrier and its distributors will now be able to install licensed water defrost systems for rapidly defrosting refrigeration coils with the use of ordinary tap water.

The validity of Recold water defrost coil patent was originally upheld in the case between Refrigeration Engineering, Inc., and the York Corporation in 1948. Recold patented water defrost coil consists of a coil, a spray head over the coil, means of supplying water to the spray head, a self-draining conduit leading from the spray head to a point outside the refrigerated space, a drip pan under the coil, and a conduit leading from the drip pan to a point outside of the refrigerated space.



OHIO
SPECIAL
ICE CANS

WELDED — RIVETED
ICE CAN GRIDS

Industrial Trucks
and Trailers

THE OHIO GALVANIZING & MFG. CO.
NILES OHIO

Carl W. Millsom New Vice President of Acme

THE BOARD of Directors of Acme Industries, Inc., of Jackson, Michigan, announce the appointment of Carl W. Millsom as Vice-president, field sales division and advertising. Mr. Millsom has been active in the air conditioning and refrigeration industry since 1935. Previous to coming with Acme, he was associated with Chrysler AirTemp, a division of Chrysler Corporation, in various execu-

Carl W. Millsom

tive sales and engineering capacities, among them regional manager with headquarters in Cleveland, Ohio. He has been with Acme Industries since 1950, first as sales manager of the Flow-Cold Division, and since 1952 as sales manager of all field sales. Acme has been an important factor in the growth of the air conditioning and refrigeration industry since 1919 and, in the period since Mr. Millsom joined the organization, has quadrupled its sales. He is a member of the American Society of Refrigeration Engineers and of the Sales Executive Club and Rotary in Jackson.

Owens Corning Appointments

THE appointment of Earl F. Swaim to head sales of cold storage insulations and other industrial insulation products in the Chicago Metropolitan area for Owens-Corning Fiberglas Corp. has been announced by James E. Higgins, Branch Manager. Swaim joined the com-

Swaim

Jensen

pany in 1940 and has served in several executive positions. Earlier this year he was named Chairman, Fiberglas Sales Builders Club, in recognition of his outstanding 1953 sales record. He will be assisted in his new responsibility by a staff of sales engineers now in training, and to be named in the near future.

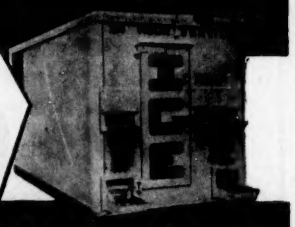
Meredith St. George Jensen was recently appointed manager of Chicago Technical Services. This group is responsible for promoting Fiberglas with major national industrial organizations, architects, engineers and general contractors. This organization will cooperate with Mr. Swaim's group. Mr. Jensen also joined the firm in 1940. Widely experienced in the building industry, he has been manager of various Fiberglas sales divisions, and from 1948 to 1950 was manager of the company's New York branch.

New Ammonia Plant

CONSTRUCTION work on an ammonia producing plant is underway at Columbia-Southern Chemical Corporation's chemical manufacturing operation at Natrium, W. Va. Design and construction of the new facility is under the supervision of the Chemical Construction Company. According to E. T. Asplundh, president of Columbia-Southern, the new plant is expected to be in production by April 1955. Estimated cost of the new facility is $3,000,000. The compressors for the new manufacturing unit will be housed in a pre-cast concrete building and the ammonia producing facility will be outside construction.

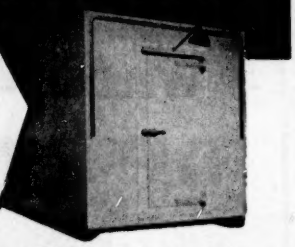
S&S ICE VENDING STATIONS
and Ice Vending Equipment

AUTOMATIC!
REFRIGERATED!
DEPENDABLE!



S&S Frozen Food & Ice Cream STORAGE DEPOTS

For Independent, Outside Refrigerated Storage! . . . Complete Ready to Plug In! Portable!

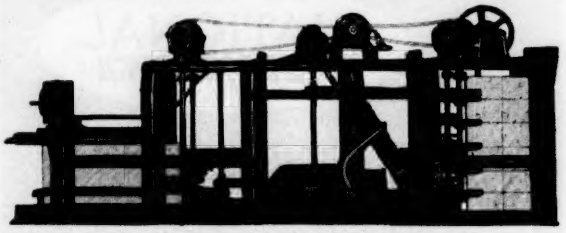


Slash distribution costs . . . add frozen food profits for chain stores and super-markets!

Sold by Leading Ice Equipment Distributors Throughout the Nation

S&S VENDING MACHINE COMPANY
670 Lincoln Avenue San Jose California

PERFECTION SPECIAL



The PERFECTION SPECIAL receives ice blocks on edge, scores them lengthwise first. Then heads up the blocks, scores them crosswise and discharges them standing on end. This is a combined heading and scoring machine and scores the blocks into any size pieces desired in one complete operation. Capacity is 4½ blocks per minute or 270 blocks per hour.

ICE-A-TERIA
Ice Vendors For Every Requirement.
Ice-A-Teria will vend block or bag ice 24 hours a day for those extra SALES!
Write for full information.

PERFECTION ICE SCORING MACHINE CO.
P.O. Box 2140, Fort Worth, Texas

Texas Company Expands Research

THE TEXAS Company has announced "substantial expansion" of its widespread research and technical activities. Augustus C. Long, President, in announcing the move, said the Company is:

1. Establishing an independent Research and Technical Department; and

2. Expanding its research facilities at the Company's principal research laboratory at Beacon, N. Y.

"The technology of the petroleum industry is advancing with great strides almost daily," Mr. Long said. "Although great advances have been made in development of improved petroleum products and establishment of a new industry in petro-chemicals, there is even greater promise in the future.

"This move by The Texas Company is designed to provide even greater emphasis on the values and benefits to be derived from modern petroleum technology. The Texas Company has long been a leader in providing the motoring public and industry in general with improved motor fuels and lubricants," Mr. Long added.

"We propose to intensify our research as a means of guaranteeing both to ourselves and to the public the greatest possible benefits from the most effective utilization of our vast petroleum resources," he asserted.

The Company also announced the election of F. H. Holmes, former assistant general manager of the Refining Department, as vice-president to head up the newly created Research and Technical Department. In addition, M. Halpern, vice president in charge of the Refining Department since 1940, was elected senior vice-president. In his new capacity, Mr. Halpern will coordinate all research activities in the company, including those of Texaco Development Corporation.

The Research and Technical Department will carry on a broad research program ranging from basic work in physics, chemistry, and engineering, to the continuous development of new products and processes. In addition, it will also provide a variety of technical services to the sales and refining departments of the Texas Company.

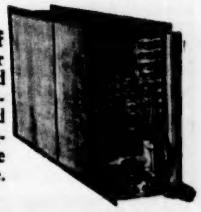
Research laboratories of The Texas Company are located at Beacon, N. Y., Port Arthur and Port Neches, Tex., and Montebello, Calif.

Central Ice Machine Co. New Frick Distributor

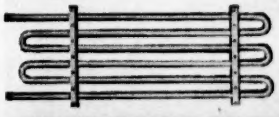
THE appointment of Central Ice Machine Company, 5014 South 24th Street, Omaha, Nebraska, as Distributors for Frick refrigerating and air conditioning equipment has been announced. The Central Ice Machine Company will cover Nebraska, eastern Iowa, and southern South Dakota, and will have the cooperation in that territory of Mr. Van J. Sparks, Manager of the Frick District Office, 611 Merchandise Mart Building, Kansas City, Missouri.

HEAT TRANSFER EQUIPMENT
REMPE CO.
Founded 1890

PIPE COILS—FIN COILS
FOR REFRIGERATION, AIR CONDITIONING, HEATING



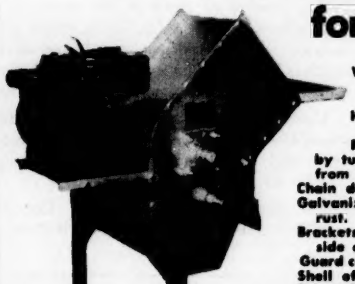
Coils and Bends of any Metal, Size or Design. Engineered to your requirements. Designed and built for longest life and the least maintenance.



Send your problems to us for engineering assistance.

REMPE COMPANY
348 N. Sacramento Blvd., Chicago 12, Ill.

BATEMAN—Gasoline Engine
ICE CRUSHER
for TRUCKS



Will take a 25 lb. regular or a long 50 block of ice.
Hopper opening 12" x 10½"
Four grate adjustments by turning the handle making from pea size to 1½ chunks.
Chain driven.
Galvanized for the prevention of rust.
Brackets for holding crusher to side of truck.
Guard covers chain and sprockets.
Shell of steel construction.
Briggs-Stratton engine, two horsepower, 6 to 1 gear reduction, retrievable rope starter.

Completely Galvanized to Prevent Rust

The Bateman Drum has solid ends to prevent ice from laying inside drum. Drum and shaft molded as one unit so no shaft coming loose on drum. Teeth are in rows rather than staggered to make better ice and less snow. Teeth can be changed from the outside of the drum in a very short time. Teeth are welded to bar that is set in taper wedged into the drum, making it impossible for teeth to come loose.

Complete selling price, Shipping weight 250 lbs.
$230.00
Bateman
Ice Processing Equipment
MINERAL WELLS, TEXAS

PIPE BENDS
Coils, and Welded Headers

Pipe coils, fabrications, or just single bends — whatever you need, our expert metal workers can produce them to your exact specifications. Even in stainless steel, or up to 6 inch extra heavy. For quality work, backed by 35 years' specialization, call on us!

We'll gladly quote on your next job.

CHICAGO NIPPLE MANUFACTURING CO.
1997 CLYBOURN AVE.
CHICAGO 14

Baker New California Distributor For Frick

THE appointment of Baker Engineering Corporation, 351 So. Anderson St., Los Angeles, as its distributor for the complete line of air conditioning and refrigerating equipment in the state of California, and the states of Baja California and Sonora, Mexico, is announced by the Frick Company.

In addition to its Los Angeles office, Baker Engineering Corporation maintains offices in San Francisco and San Pedro, and warehouse facilities in Oakland. Officers of the Corporation are C. E. Hollingworth, president, V. E. Kauffman and T. H. Shonfeld, vice presidents and Neal S. Templin, secretary-treasurer. F. H. Vann heads the San Francisco office and Ben F. Duncan the San Pedro Office.

Mojonnier Bros. Appoints New Sales Engineers

THE appointment of four sales engineers has been announced by Mojonnier Bros. Co. Chicago, Ill., manufacturers of dairy and food processing equipment. U. F. (Frank) Asselin, Jr., sales engineer for the southeastern states territory, has devoted the greater part of his life to dairy plant problems and operation having grown up in the dairy business at his father's plant, the Asselin Creamery of Norway, Mich. His headquarters will be in Atlanta, Ga. Prescott S. Farrar, sales engineer for the eastern Pennsylvania and southern New Jersey territory is a graduate in dairy technology at the University of New Hampshire, and attended Ohio State University for graduate study, then entered active employment in fluid milk plant operations at Hillcrest Dairies, Inc., Worcester, Mass. Hartl R. Jones, sales engineer for Ohio, West Virginia, western Pennsylvania and Virginia, is a graduate of Ohio State University. During two years in the Army, he served as dairy products inspector and later was an employee of the Ohio State University dairy for four years. Kenneth D. Pylant is sales engineer for Florida. A former instructor in the State of Florida education department, he was appointed district supervisor for the Florida Live Stock Sanitary Board in 1948 and served in that capacity for almost four years.

New Mojonnier sales engineers. Top left, U. F. Asselin; Top right, Prescott S. Farrar; bottom left, Hartl R. Jones; bottom right, Kenneth D. Pylant.

CATALOGS AND BULLETINS

New Catalog Simplifies Selection of Chillers

A NEW catalog on Acme Flow-Therm packaged Liquid Chillers has been issued by Acme Industries, Inc., Jackson, Mich. A new idea in selection procedure is announced that enables the user to obtain a unit tailored to his requirements, yet embodying the advantages of a factory-assembled and tested "package".

The major components of the standard Flow-Therm package, an Acme Dry-Ex Chiller and an Acme Shell-and-Tube Condenser, are first selected by means of simplified job-tested data to match in capacity and performance, with the compressor to be used on the job. Then, matching heat exchanger, Acme-engineered control package and interconnecting refrigerant lines and wiring are automatically specified by Acme and factory-assembled on a standardized supporting framework. The catalog points out that "the user will benefit from minimum erection and installation expense, from space-saving size, and from pre-piped and tested refrigerant circuits for balanced, efficient performance."

Included in the twelve models of Flow-Therm packaged Liquid Chillers listed are units for one-compressor, single-circuit installations and others for two-compressor, dual refrigerant circuits.

Gifford-Wood Offers Bulletin on Ice Breakers

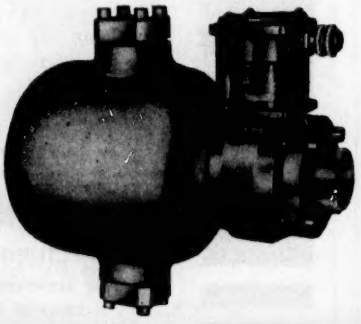
A 20-PAGE bulletin, offered by the Gifford-Wood Co., Hudson, N.Y., pictures and describes a complete line of G-W ice breakers, ice sizing, and auxiliary equipment.

The first section of the bulletin covers breakers. It includes detailed descriptions of four types of G-W drums and nine models of breakers with capacities ranging from 3 to 50 tons per hour. Specifications include: hopper size, capacity, floor space, height to feed plate, number of picks, number of teeth in the coarse and fine combs, hp of motor, drum speed and average weight. Also covered are drive mechanisms, size control, materials of construction and chute connections.

Continuing, the bulletin covers four types of ice sizing plants and gives design features, bin capacities and elevator heights in detail.

The next section presents a line of G-W equipment used in the ice industry;

the MS FLOAT SWITCH is different 3 ways...



1 **Close Control** of refrigerant level through lever-ed float action. Only 1¼" differential between high and low levels.

2 **You see** the true and exact refrigerant level through full view sight glass. No bubbling, no guessing.

3 **Transparent,** *waterproof* housing encloses novel magnetic actuated switch.

Thousands in everyday use, everywhere. Bulletin #243 gladly sent upon request.

MOJONNIER BROS. CO. 4601 W. OHIO ST., CHICAGO 44, ILL.

Mojonnier MS FLOAT SWITCH

cubers, scoring machines, tiering machines, elevators, and up-enders. Finally, the concluding section gives descriptions and illustrations of tank-room and storage conveyors, as well as case, can and package conveyors for the dairy and food industries.

New Trane Bulletins

NEW TRADE literature is now available from The Trane Company, La-Crosse, Wis., manufacturing engineers of air conditioning, heating, ventilating and heat transfer equipment on three product lines, the improved self-contained air conditioning units, the Cold Generator line with capacities extended to 100 tons and improved Torridors with Delta-Flo fin coils.

Information, including capacity tables and roughing-in dimensions, on cold generators is available in Bulletin DS-352. This factory-assembled unit is now available in capacities ranging from 10 to 100 tons. A completely new bulletin DS-361 describes Trane reciprocating compressors. In addition to information on new Freon 22 units and duplex models, it has capacity tables, specifications and information on operating features for compressors and condensing units with capacities ranging from 10 to 100 tons. Bulletin DS-362 presents complete information on improved Trane self-contained units with capacities from 3 to 20 tons. Units of 3, 5 and 7½ ton capacity are now available with the new hermetic compressor.

Super Freezer Door Catalog

SUPER FREEZER doors for use to minus 50 F are described in a new catalog issued by the Jamison Cold Storage Door Co., Hagerstown, Md. Construction and design details are given along with a valuable check list for picking the right kind of door for the application. Included are complete specifications for various standard doors. Optional features with advantages are also featured. Size tables and dimension details are listed for both the walk-in, reach-in type of door and the vestibule type of door. Sketches, photographs, illustrations and prints to scale supplement the product presentation. Three full pages show various types of Jamison Super Freezer doors in a broad range of uses.

Bulletin on Compressors

UP-TO-DATE details on multi-cylinder ammonia compressors and boosters are contained in a bulletin issued by The Creamery Package Mfg. Company of Chicago. Complete refrigeration flow diagrams for both booster and single-stage compression refrigeration systems are presented in the new bulletin, along with construction information and dimensional diagrams on the company's Type "K" 4-cylinder and 6-cylinder units in eight models. Copies are available from The Creamery Package Mfg. Company, 1243 W. Washington Blvd., Chicago 7, Ill.

ONE CONTROL DOES THE JOB OF TWO

Mercoid DA-400 Series Pressure Controls incorporate a single bourdon tube which actuates two independently adjustable Mercoid magnet operated mercury switches to accomplish various circuit operations. For example:

1. Close one alarm circuit at high pressure and another at low pressure with both circuits open over operating range.
2. As an electrical interlock to open one circuit as pressure rises above and the second circuit as the pressure drops below operating range.
3. To provide two-stage control by opening or closing one circuit on a rise in pressure and the second circuit on a further rise in pressure.

Ranges 0-30" to 300-2500 psi

Write for Bulletin SP

Classified Advertising

All classified advertisements are payable in advance. Except for Positions and Help Wanted classifications, this section is reserved exclusively for USED equipment.

RATES: 20c per word; minimum 25 words. $2.00 per line for bold face headings: $15.00 per inch for line listings.

POSITIONS AND HELP WANTED

WANTED—Experienced operating engineer for 300 ton plant. Car ice only. Write to P.O. Box 122, El Paso, Texas.

WANTED—Salesman for cold storage insulation contracting work, Northern New Jersey territory. Excellent opportunity for qualified man. Apply only by letter giving extent of experience in this or related field. Eastern Cold Storage Insulation Co., 136 East 41st St., New York 17, New York.

USED EQUIPMENT—wanted & for sale

WANTED—290- 400-pound cans. Address Box SP-3, c/o Industrial Refrigeration, 435 N. Waller Ave., Chicago 44, Ill.

LIQUIDATING
LARGE ICE PLANT IN BALTIMORE
7—York ammonia compressors—9x9, 10x10, 16x18.
3—ice tanks.
2300—ice cans, galv., like new.
2—Shepard Niles cranes with trolleys & rails.
1—5-can hydraulic dump table, dip tank and can filler.
1—27-can York can filler, dump table and dip tank.
7—new galv. set-out trays for 5-can groups.
Ammonia condensers, receivers, pumps, air compressors.
All motors are 440 volts, 3 phase, 25 cycle.
Write for detailed list. Immediate delivery.
H. LOEB & SON
4643 Lancaster Ave., Philadelphia 31, Pa.

FOR SALE—10"x7" Worthington Booster; 8x8, 9x9 Yorks; 4x4, 5x5 Fricks; 3x3 self-contained York. Write E. Niebling, 1546 St. Clair, Mt. Healthy, Cincinnati 31, Ohio.

FOR SALE — COMPLETE ICE PLANTS
20 tons to 150 tons
AMMONIA COMPRESSORS
10x10 York—125 hp. syn. motor
10x10 York, direct connected to Unaflow steam engine
9x9 York—7½x7½ York, high speed
5x5 York—V-belt drive, 20 hp. motor
MISCELLANEOUS EQUIPMENT
2-100 ton York evaporative condensers, (ammonia)
130 hp. Diesel engine, with 109 KVA generator
75 hp. 300 RPM synchronous motor
JOHN F. CARSON
"A" & Venango Sts., Philadelphia 34, Pa.
GArfield 6-2221

FOR SALE—USED ICE PLANTS & REFRIGERATING EQUIPMENT
Complete Ice Plants 20 to 100 Tons
Ammonia Compressors, 3" x 3" to 12½" x 14½"
Condensers, Cranes, Blowers, Scoring Machines, Ice Canes—Various sizes.
Write or wire us on any equipment you may need.
ENTERPRISE EQUIPMENT CORPORATION
77-79 Alexander Street, Yonkers, New York
Cable Add.: ENEQCO Ph.: Yonkers 8-8118-9

FOR SALE—York, Frick and Vilter high speed, York slow speed, 6x6 with motors, 10½x10½, cranes, can fillers, condensers, brine coolers, can agitators, blowers, ice plants, Diesels. Parke Pettegrew, 370 West Broad St., Columbus 8, Ohio.

FOR SALE
3—10x10 V.S.A. Frick ammonia compressors direct connected to syn. motor.
2—9½x10½ H.D.A. Vilter ammonia compressors direct connected to syn. motors.
2—10½ x 14½ H.D.A. Vilter ammonia compressors direct connected to syn. motor.
1—46"x14' vertical shell & tube condenser.
2—34"x15' single pass brine coolers.
2—24"x18' ammonia receivers.
2—Allen-Billmyre low pressure blowers.
600—11x22x51 ice cans.
Assorted ammonia oil traps and fittings. We will service and erect plants anywhere.
DAVID BERNARD REFRIGERATING SERVICE
72 Broadway N. Irwin, Pa.

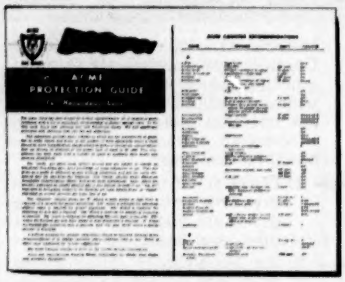
FOR SALE—Three units 10 & 15 h.p. Westinghouse direct drive for either air conditioning or refrigeration; late model at 1/3 original cost. Write 115 N. Eastern Ave., Los Angeles 22, Calif.

FOR SALE—Ammonia accumulator 20" x 7', new 1950, cost $448.00, price $150.00. Ammonia receivers 16" x 10' and 16" x 8', $50.00 each. Larger equipment installed in new plant. J. J. Schmidt Inc., 2133 Central Ave., Cincinnati 14, Ohio.

QUICK RESULTS with Classified Ads

The classified section is the market place of the industry. Get fast action on equipment you want to buy or sell. Buyers are watching for equipment they can use. Convert idle equipment into cash. INDUSTRIAL REFRIGERATION classified rates are low — results quick.

DO YOU HAVE A GAS HAZARD?



New ACME PROTECTION GUIDE
lists 433 gases, mists, fumes and dusts and gives specific protection information.

If you have any hazardous condition involving gases, mists, fumes or dusts, it will pay you to get a copy of Acme's new Protection Guide. Here, in one handy reference folder, is a most comprehensive list of trouble sources including pertinent data, limits, and the Acme canisters designed to give you dependable protection for each specific hazard.

Write today for your free copy of the ACME PROTECTION GUIDE.

Acme Protection Equipment Co.

Manufacturers of Acme Full-Vision Gas Masks
3037 West Lake Street
Chicago 12, Illinois

VAN RENSSELAER
H. GREENE

ENGINEERS

COMPLETE PLANT DESIGNS INCLUDING BUILDING AND EQUIPMENT

11 PARK PLACE NEW YORK 7, N. Y.

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& ASSOCIATES

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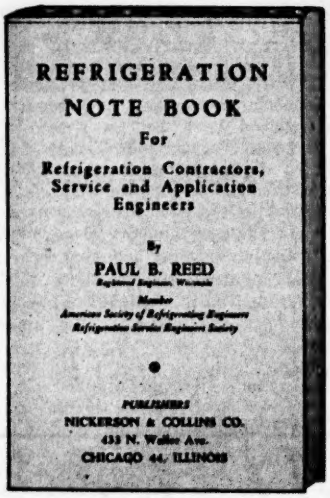
Industrial Power Plants
Refrigeration and
Cold Storage Warehouses,
Reports, Appraisals and Management

A Vest Pocket Book of Valuable Data

REFRIGERATION NOTE BOOK

by PAUL B. REED



Vest Pocket Size—3¼ x 5 Inches
204 Pages—Flexible Binding

THIS NOTE BOOK of condensed refrigeration information represents many years of work in accumulating practical data—"culling out" all extraneous material—so as the author states, "the reader will find a handy and easily carried source of information not usually kept in memory."

You will be surprised at the wealth of material that has been included in this convenient and practical reference Note Book. It is written in layman's language, without complicated formulas. In short, it is a tool responsible for the operation of refrigeration equipment.

$2.00 Postpaid

Nickerson & Collins Co., Publishers
433 N. Waller Ave., Chicago 44, Ill.

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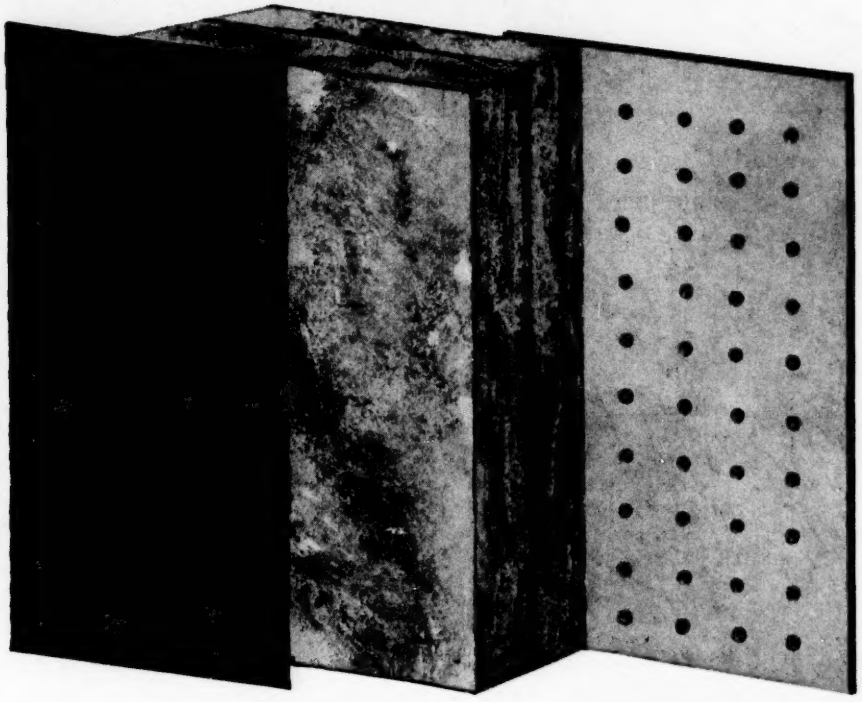
WHY THE TREND IS TO FIBERGLAS!



VAPOR SEAL, *on the warm side* only, *stops nearly all vapor from getting into the insulation.*

FIBERGLAS PF INSULATION *is installed without multiple vapor barriers ... no internal vapor-resistant surfaces to cause condensation within the insulation.*

VAPOR POROUS FINISH *of perforated hard surface board on cold side of wall provides an interior finish that lets vapor pass through freely. Inexpensive, easy to install.*

stays dry...stays efficient!

No "locked-in" moisture to cause trouble in Fiberglas* PF dry wall construction

RESULT: Cold storage insulation installation that's unsurpassed for thermal efficiency and economy. The negligible amount of vapor that penetrates the highly efficient vapor barrier passes easily through Fiberglas PF *as vapor*. It won't condense and cause lower thermal efficiency and costly repairs. And, the inorganic fibers of glass in PF insulation won't soak up moisture, won't rot.

As for installation savings—large lightweight panels of Fiberglas PF are quickly and safely installed between treated wood studs or with metal clips. If the insulated walls must be altered for structural changes or remodeling from coolers to freezers, insulation and finish can be readily removed and replaced at low cost.

Today, the recent installation of Fiberglas PF in many of the largest sharp freezer warehouses continues the trend to PF—a trend begun 15 years ago.

Dry wall construction is only one application for versatile Fiberglas Insulations. The complete Fiberglas line offers you a full range of sizes, types, thicknesses and densities.

Outstanding advantages of Fiberglas Insulations

Extremely low thermal conductivity • maximum versatility • a product for every need • low installation and maintenance costs • highly moisture-resistant • easy to cut and apply • good handling characteristics • fibers are glass and will not burn or rot • lightweight • odorless • will not expand or contract • effective for life of building.

*Fiberglas is the trade-mark (Reg. U.S. Pat. Off.) of Owens-Corning Fiberglas Corporation.

FIBERGLAS

Owens-Corning Fiberglas Corporation
Dept. 165-I, Toledo 1, Ohio

Please send me the literature I have checked.

- ☐ Why the Trend is to Fiberglas
- ☐ Insulations for Low Temperature Structures and Equipment
- ☐ PF Design Details

Name_____

Title_____ Firm_____

Street_____

City_____ State_____

Arctic Test Conditions In Sunny California. California Research Corporation, Richmond, California uses Jamison Double Super Freezer Doors on its low temperature laboratory for petroleum products testing.

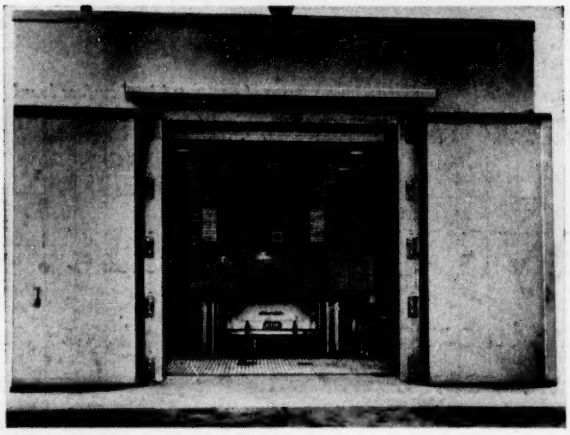
PROBLEM SOLVED

NEW JAMISON DOOR FEATURE PREVENTS ICE FORMATION

Cold storage doors for low temperature rooms have always been plagued with the problem of moisture condensation and ice formation on the frame—particularly when temperatures run to —40°F. and below.

Jamison has now solved this problem by building a Door for low temperatures with thermostatically controlled heater cables embedded in the frame directly beneath the gasket. The heater keeps the area of gasket contact with the frame above the dew point temperature. This eliminates frost formation by preventing moisture condensation.

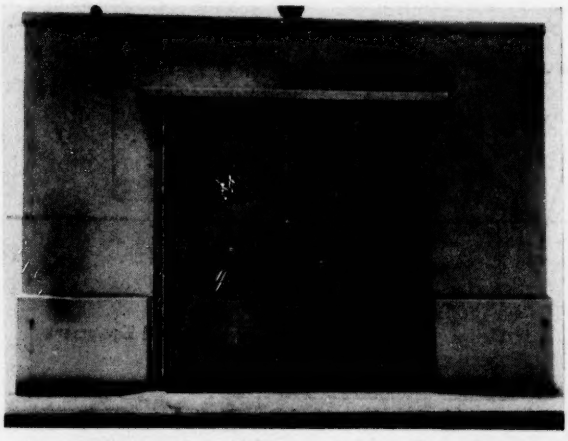
For any cold storage door problem, Jamison will help you solve it with a door that meets your particular needs. Consult your architect or write to JAMISON COLD STORAGE DOOR CO., HAGERSTOWN, MD., U. S. A.



Heater Cables Prevent Ice Formation. Area of gasket contact with frame kept above dew point temperature.

JAMISON
HAGERSTOWN, MARYLAND, U. S. A.

More JAMISON Doors are used by *more* people than any other Cold Storage Door in the world.



Heavy Duty Jamison Hardware Assures Easy Operation. Adjustable feature of hardware permits a tight seal to be maintained at all times.